

P L A T E S

OF

DISTORTED SPINES.

THE GREAT BRITISH MUSEUM

OF NATURAL HISTORY

AND MINERALOGY

GEOL. DEPT.

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F. 585

ENGRAVINGS,

ILLUSTRATIVE OF A WORK

ON

The Nature and Treatment

OF

THE DISTORTIONS

TO WHICH

THE SPINE

AND

THE BONES OF THE CHEST

ARE SUBJECT.

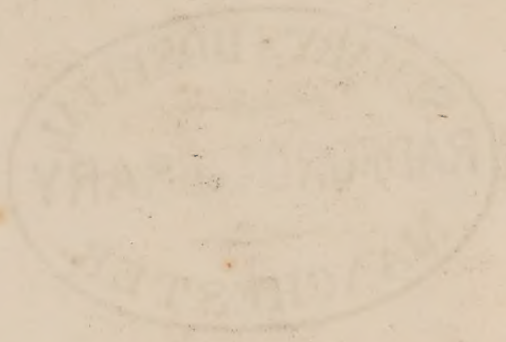
By JOHN SHAW,
SURGEON, AND LECTURER ON ANATOMY.

LONDON:

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ENGLAND

ILLUSTRATIVE OF A WORK

ON

THE NATURE AND EXTENT

OF

THE DISTORTIONS

TO WHICH

THE SPINE

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ARE SUBJECTED

BY JOHN SHAW,

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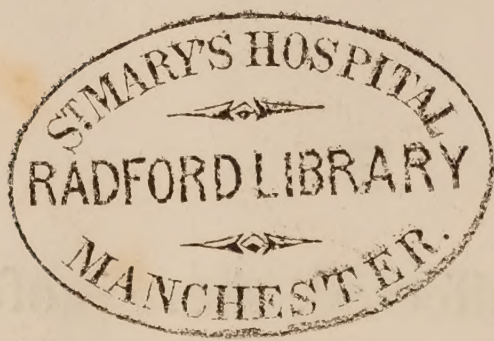
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NOT FOR CIRCULATION



ON THE

SYMPTOMS AND APPEARANCES

PRODUCED BY

A SLIGHT DEGREE OF LATERAL DISTORTION

OF

THE SPINE.

IN the accompanying volume, I have endeavoured to point out the different conditions of the constitution, which may render a young person liable to become distorted; and I have entered at some length into an investigation of the various opinions regarding the causes which produce distortion. I shall now confine myself to the description of such states of the spine and ribs, as admit of being demonstrated by the Plates in this volume.

When the spine of a girl about the age of fourteen is becoming crooked, the attention of the mother or governess is at first directed to the state of the shoulders or breasts. At this age, it is most frequently to the latter; one breast either appearing larger than the other, or growing so unequally as to lead to a suspicion that it is diseased, or that "one of the breast-bones is growing out of its place." But in a younger girl, the shoulders generally attract attention first, as the right appears enlarged, and when the shoulder-blades are compared, the right is found farther removed from the spine than the left, and with its inferior angle lying flat upon the ribs, while that of the left projects.

When the shoulders are thus affected, there is often an apparent enlargement of the left hip; and it is in consequence of this, that a mother describes the state of her child, when its spine is slightly distorted, as “a *growing out* of the right shoulder, and of the left hip.”

When a girl so affected is in certain positions, one leg appears longer than the other; and when she walks, there is not only a constrained position of the head and neck, and an inclination to one side, but there is also an inequality in the step, so that the body is carried obliquely forwards, or with one side rather more advanced than the other. It may be frequently observed, that girls in this condition have a habit of putting one arm behind the back, and taking hold of the inside of the other elbow, thus assisting to balance the figure, by pulling down one shoulder and elevating the other.

If the back be examined, the spine will be found curved nearly in the form of the italic *f*, and perhaps with a slight bend outwards, which will be most remarkable in the loins, and especially when the patient is sitting. The whole of the right side will be of a rounded and barrel-like form, while the left is diminished and contracted, the ribs being closer together than is natural. There will also be a depression or sinking in of the right, and a fulness between the ribs and hip of the left side, so that the whole space between the left hip and arm-pit is almost in the same line.

This description nearly corresponds with the condition of the spine and ribs when the distortion is very slight; but a little increase in the curvature of the spine produces a considerable change in the general appearance. The effect is most observable in the alteration of the position of the right scapula; for this bone, instead of being farther removed by the increase of the curve, is brought nearer to the spine; and hence, although the right shoulder is higher than the left, it is not now so broad. But there is considerable variety in the state of the shoulders, even in cases of slight distortion. In some instances, the lower angle of the right scapula projects, so that the hand may be put between it and the ribs, while in cases similar to that represented in the plate in the next page, the scapula clings close to the ribs, and gives a roundness, instead of a flattened appearance, to the shoulder.

The elevation of the right shoulder is made more remarkable by the depression of the upper part of the left scapula, and by the projection of its lower angle. The first is a consequence of the condition of the upper ribs, as demonstrated in the second figure of the second Plate; the other is caused by the sinking in of the spinal ends of three or four of the middle ribs. This is especially worthy of attention, as it proceeds from the transverse processes of the dorsal vertebræ (to which the ribs are attached), being thrown towards the fore-part of the chest by that peculiar twist of the spine on its axis, which has been scarcely observed by any author, although it always accompanies even the slightest degree of serpentine curvature.



Although the deformity represented in the sketch above, is caused principally by the change in the position of the bones, the appearance of distortion is much increased by the condition of the muscles of the back. In a weakly girl, the individual muscles cannot be distinguished unless they are brought into action; but when this is done, the *trapezius* has a very peculiar

appearance, its outer margin being more distinct and round than is natural; the *latissimus dorsi* also, instead of lying upon the lower angle of the right scapula, as when the chest is properly formed, is placed below it, and hence a very peculiar twist, extending from the part of the spine opposite to the lower angle of the scapula, to the ridge of the left ilium, may be observed when the patient endeavours to hold herself erect. The smaller muscles connected with the scapula, although not so visibly altered, are still so far affected, as to produce considerable change in the appearance of the back, for by the combined effects of the displacement of the scapula and of the larger muscles, they are so deranged in their actions, as to become almost paralytic, and unable to support the scapulæ.

When the spine is distorted to the degree represented in the Plate, the right side of the neck appears swollen. In some instances, this swelling has been mistaken for a tumor; and in the accompanying volume a case is related where the practitioner was so much deceived, as to attempt to remove the swelling by bleeding and blistering. The enlargement, as demonstrated in Plate II., is caused by the change in the position of the upper ribs, and of the muscles which lie upon the transverse processes of the cervical vertebræ.

The condition of the loins when the spine is slightly distorted is distinctly marked in the Plate. The fulness of the left and the depression in the right side depend principally on the state of the bones, as demonstrated by the figures in Plate II., but even when the distortion is slight, a considerable degree of the deformity is a consequence of the change in the position of the muscles. The hollow on the left side between the shoulder-blades has already been shewn to be caused by the rotation or twist of the spine on its axis, throwing the transverse processes of the dorsal vertebræ inwards, and thus placing the muscles lying upon these processes, on a lower level than those of the right side. But the condition of the muscles of the loins is exactly the reverse, for as the twist of the spine on its axis is in the opposite direction, the muscles of the left side are raised or projected, while those of the right are depressed. The fulness of the left loin produced in this way, has been referred to increased muscularity by those who consider distortion of the spine to depend on an irregular action of the muscles, while by machine-makers it is generally mistaken for a tumor, and which they conceive may be repressed by instruments.

In cases of slight deformity, the only circumstance remarkable in the right loin, is the sinking in or hollow above the right hip, but when there is a considerable degree of distortion, the sacro lumbalis and longissimus dorsi form such a distinct line between the pelvis and ribs, as to be sometimes mistaken for a part of the spine. It is also important to observe that both these muscles, and those of the lateral part of the abdomen, are actually shortened in such cases. This I do not conceive to be the effect of *contraction*, but an accommodation of the muscles to the condition of the skeleton. A similar state of some of the muscles of the neck, is described at page 255, in the accompanying volume.

During every period of the disease, it is important to attend to the state of the shoulders and breasts, because their form alters very much, according to the degree of distortion, or to the plan of treatment which has been pursued.

When the spine is not much distorted, the right shoulder and breast are larger and more prominent than the left ; but if the curve of the spine be increased, although the right shoulder is large and round, the breast of the same side may be flat and depressed. It may also be occasionally observed, that the breast and the upper part of the neck, on the left side, are prominent, while the same parts, on the right side, are lower, although the right shoulder-blade is more prominent than the left.

When the curve is increased, the ribs become flattened in front ; and hence, the more prominent and round the shoulder is, the flatter the breast generally becomes. But if the distortion be permitted to increase to a degree similar to that represented in some of the figures in the third plate, a complete change takes place in the form of the chest. As this and many other varieties will be more easily comprehended by the explanation of the several plates, I shall now describe the sketches, by which the causes of the slighter degrees of distortion are illustrated.

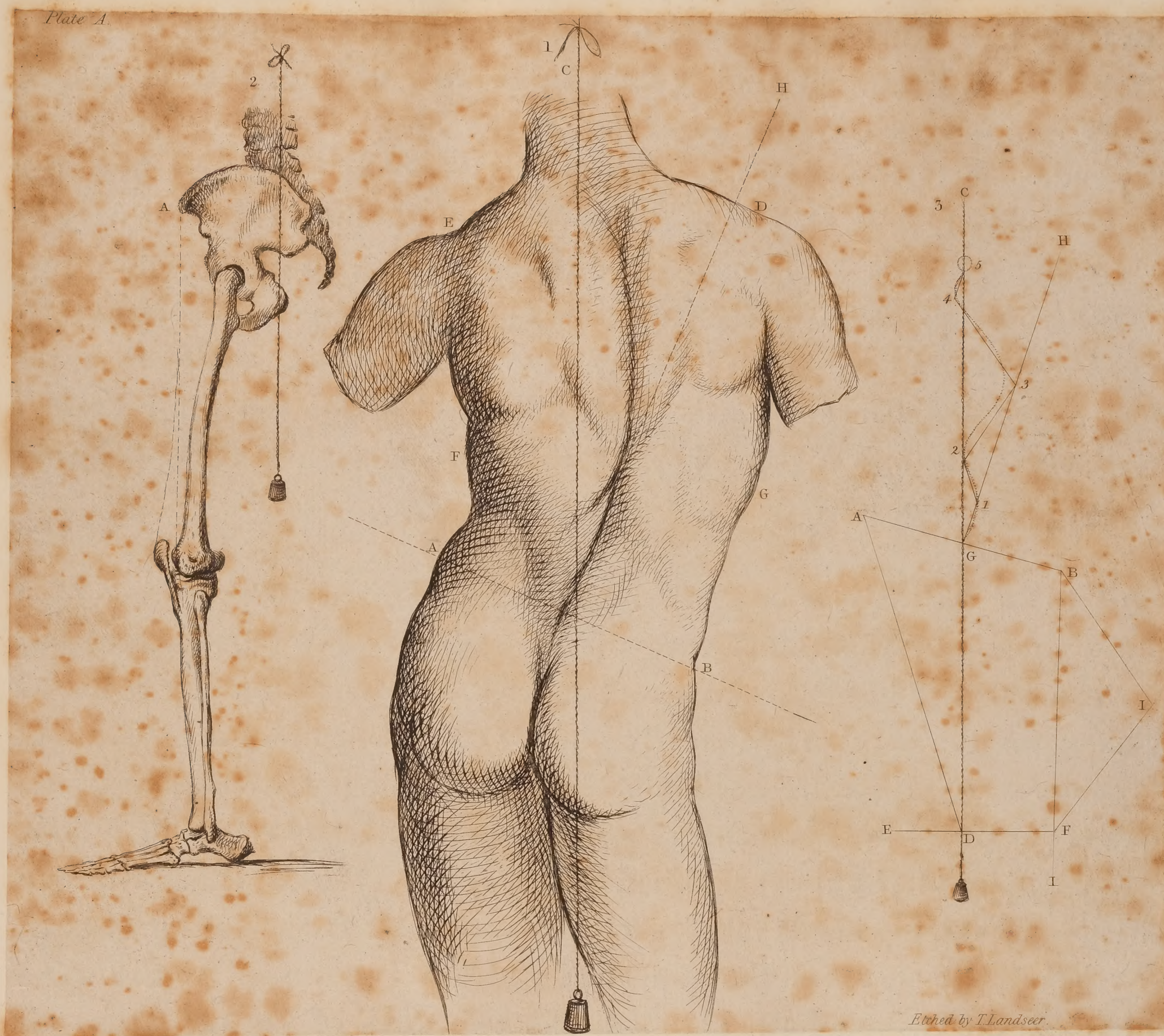
It has long been known, that the tendons and bones of the leg of a bird are so arranged as to form a sort of mechanical apparatus, which being operated upon by the weight of the body, enables the bird to rest upon one leg without any necessity for muscular exertion. But it was not observed until demonstrated by Mr. Charles Bell, that the most perfect apparatus of the same kind also exists in the human body. Every one must have felt a degree of painful exertion in standing equally on both feet for some time, and be conscious that to relieve himself of the irksomeness of this position, the body is insensibly brought into the same position as that of the soldier when he is ordered to *stand at ease*, i. e. The whole weight of the body is thrown on one leg, while the knee of the other is bent. As standing in this manner tends to produce distortion, and as it is the position into which the body naturally falls when fatigued, it may be useful to shew why it is a posture of comparative ease, and to point out the consequences of indulging in it.

When a person stands on one leg, the weight of the spine, and consequently of the upper part of the body, bears on the back part of the pelvis, and posterior to the centre of motion in the acetabulum. By this position of the body, the fascia lata (marked by the dotted line in the diagram No. 2. in Plate A.) which stretches down from the ilium A, upon the outer and fore-part of the thigh, to be attached to the patella and bones of the leg, is rendered tense, and thus braces and supports the extensor muscles. While the weight of the body coming thus in aid of the muscles, tends to the extension of the leg, the perpendicular position of the tibia upon the astragalus fixes the ankle joint, and hence the body is sustained without much muscular exertion, and nearly in the same manner as is shewn by Borellus in his work *de Motu Animalium*, to be that by which birds are supported while they stand on one leg.

The consequences of a child habitually standing in this position, may be understood by an examination of the figures in Plate A.

In the principal figure, the spine appears twisted, the right shoulder is higher than the left, and the left hip projects more than the right. As nearly the same appearances may be observed in cases where the spine is actually distorted, this figure shews how much certain positions give the character of deformity to the finest shape; for the sketch is taken from

the *Antinous*, the statue which by way of distinction has been called the “admirable.”



The cause of the apparent distortion may perhaps be thus explained. When the body is balanced on one leg, the situation of the pelvis is so altered by rolling on the heads of the thigh-bones, that one side is on a higher level than the other. To demonstrate the effect of this position of the pelvis, let the line *A B* (in diagram No. 3.) be drawn in the direction of the superior anterior spinous processes of the ilia of the principal figure. From the middle of *A B*, *C D* is to be carried perpendicular to a horizontal line *E F*, placed below *A B*, at a distance nearly equal to the length of a leg proportionate to the breadth of a pelvis represented by *A B*. By drawing a line from *A* to *D*, where the horizontal *E F* is crossed by the perpendicular, the inclination of the left leg will be given; and if the perpendicular be continued to nearly the same distance above *A B* as it is below it, the situation of the head 5 will be marked, and the perpendicular will shew the line of gravity from the head to the foot.

On comparing this diagram with the principal figure, the perpendicular C D is found to correspond nearly with the plumb-line C. Supposing that the spine rises from the middle of the line A B (i.e. from the middle of the pelvis), it is evident that it must be curved, or form several angles, before it can reach 5 (the situation of the head), which is in a line perpendicular to the centre of gravity. The column must at first rise perpendicular to A B, that is, in the direction of the line H G ; if it were to be continued in this line, the balance would be lost, and the body would fall ; there is therefore a necessity for a second curve towards or beyond C G, but as the weight would then be thrown too much to the opposite side, there must be a third curve towards G H, from which, for the same reason, there is a fourth, to a point beyond the perpendicular C G, and lastly, a slight inclination towards the head 5.

All these inclinations are so gradual and so slight in the spine of a person properly formed, that with the exception of the curve marked 3, they can scarcely be discovered, and indeed may be completely removed by changing the position of the pelvis, or by an exertion of the muscles of the spine. But when the position of standing on one leg becomes habitual, there is danger of the ligaments of the vertebræ gradually acquiring a form corresponding to the usual position of the spine. If this change in the condition of the ligaments takes place, a distortion of the spine is produced, even before the shape of the individual vertebræ is altered ; for the spine will retain the twisted form although the two sides of the pelvis are on the same level, and the weight of the body supported equally on both legs. This is farther described in the explanation of Plate II., where it is also shewn that the curve commonly produced by weakness, is nearly of the same character with that which proceeds from habitual bad position. The cause of the *apparent* shortening of one leg, which is so frequently observed in cases of distortion, will also be readily understood by comparing the diagram just described with that in Plate II.

SKETCH IN ILLUSTRATION OF THE EFFECTS PRODUCED UPON THE SPINE,
BY THE HABIT OF LYING IN THE SAME POSITION IN BED.



The consequences of a long continuance in the position represented by this sketch must have been observed by those who attend an hospital, as there is scarcely a patient who suffers from the common disease of the hip, whose spine is not more or less curved in this way. Indeed in some instances of this disease, the part of the spine between the neck and the pelvis is bent nearly in the form of an arch, from the patient being not only obliged to lie on the side, but to approximate the pelvis and ribs, so as to relax the muscles of the loins.

This sketch, although it may serve to illustrate the distortion consequent on disease of the hip, is offered here to exhibit one of the causes of the common lateral or serpentine curvature of the spine. It represents the manner in which the loins sink when a child lies on a feather-bed, and the degree to which the right shoulder is raised above the left, by lying on the right side, while the head and shoulders are supported by a high pillow.

As many instances of the bad effects of a similar position may be observed even in grown-up persons, it will be admitted that a child naturally of the finest form, may become distorted by habitually lying so. However, although the posture be obviously bad, I do not believe that it will produce curvature of the spine, if there be no other cause operating, and if the child take active exercise during the day. But if there be a disposition to curvature, and especially if there be already such a degree of distortion of the spine, as to raise the right shoulder, the position must increase the curve, since it expands and separates the ribs of the right side from each other, while those of the left are compressed together, and approximate the pelvis. Indeed on comparing the sketch with the skeleton in the second Plate, it will be found that with the exception of the curvature of the lumbar vertebræ, the spine and ribs, and more particularly the shoulders, are brought exactly into the same condition by lying on the side and with a high pillow, as they are when distortion of the spine has actually taken place.

It may therefore be laid down as a rule, that when a child has the slightest tendency to distortion, she should not be permitted to use a high pillow, and should, if possible, be obliged to lie on her back while asleep. The only objection to this mode of lying is, that it sometimes produces slight difficulty of breathing; but if there be no disease of the lungs, and if sufficient exercise be taken during the day, the loss of the pillow will soon be forgotten. But as it cannot be expected that a child will remain in the same position during a whole night, and as it is most essential to the cure of a lateral curvature, that the pelvis should be prevented from approximating the shoulders so as to curl up the body, it is necessary that very effectual means should be used for this purpose. These have been described in the accompanying volume; but here I may state, that in some instances, I have found a simple contrivance effectual in preventing the patient from turning on the side, and consequently in preventing the pelvis from being drawn up towards the shoulders. It is merely a pair of soft shoes, which are fastened together by thin plates of iron on the soles, so as to keep the feet about an inch separate. If the child, having these on, turns upon the side, the ankles and knees press upon each other, and with so much pain, that the position is soon changed. This apparatus is also very useful in cases of weakness of the ligaments of the knees and of the ankles, as it not only keeps the joints in a proper position during the night, but may with a trifling addition be made the

means of strengthening them. A firm mattress is indispensable, as the bend in the loins, which is often combined with lateral curvature, is liable to be increased by the patient lying on a feather-bed, although she may be all the while on her back.

When a curvature of the spine, similar to the natural bend represented by this sketch, occurs in a patient with disease of the hip, it is so obviously produced by the change that necessarily takes place in the form of the ligaments and of the bones, and not by *disease* of the vertebræ, that it might be considered almost superfluous to say that no active surgical treatment is necessary. Yet I have met with instances, where blisters and even large caustic issues had been applied, and on no better grounds than that such is the treatment recommended for the cure of *curvatures* of the spine. It may however occasionally happen, that the vertebræ are attacked with the same scrophulous disease which has already affected the hip joint.

S K E T C H

IN ILLUSTRATION OF

THE EFFECTS PRODUCED BY THE POSITION, IN WHICH GIRLS FREQUENTLY SIT,
WHILE WRITING OR DRAWING.

At page 208 in the accompanying volume, I have attempted to shew the bad effects produced on the parts forming the spinal column, by a position similar to that represented by the sketch in the next page. It is there stated, that when the spine is bent to a considerable degree, the muscles of the back are called into action to support the head; but, when the stoop is only from the middle of the body, as in the position of a person working or writing at a table, that there is no longer any necessity for their action, as the head is then supported by the *ligamentum nuchæ*. This ligament being kept constantly on the stretch becomes lengthened, and when this is combined with the effects of the want of muscular action, the deeper ligaments gradually yield, and the vertebræ become altered in shape, so that an almost irremediable stoop is gradually produced.

By sitting in the manner represented here, the shoulders and ribs are brought so nearly into the same position as they are by the use of a high pillow, that the habit must tend to produce lateral distortion of the



spine. The effects may be partly counteracted by the girl sitting erect, and putting a book or board under the left arm, so as to prevent her from leaning to one side while writing or drawing. But such simple means are neither sufficient nor likely to be attended to. It is necessary to use something more effectual and more complicated in appearance. I have seen much benefit derived from the use of the apparatus described at page 212, and drawn in the first figure of Plate VII., especially when it is combined with balancing a book or something light upon the head. The head is thus kept erect, while the muscles of the back are at the same time brought into a state of exertion. In proposing this plan, which is discussed at length in the accompanying volume, it should not be forgotten, that it may be necessary to use spectacles, as a child often stoops from being short-sighted.

These contrivances however, are not sufficient to support a girl who has even the slightest lateral distortion of the spine, for although she may be

apparently sitting erect, while she uses them, the lumbar part of the spine will be found to incline to one side, or to project directly outwards. The manner of preventing and of counteracting this, is shewn in the accompanying volume, and in the explanation of the seventh plate.

As a girl seldom begins to play upon the harp, until her bones are pretty well knit together, and as there is a considerable degree of exertion requisite while she is playing, the origin of curvature of the spine can seldom be referred to this position.



But I have introduced this drawing to shew how much danger there is of a distortion which has already commenced being increased by the position ; for as the sketch was taken from the figure of a fashionable music-mistress, it shews how much the most approved manner of sitting, while playing on the harp, tends to produce the same effects on the spine, and consequently on the shoulders and ribs, as the postures represented by the preceding figures.

Trusting that these sketches, and the observations which have been made in the accompanying volume, will be considered as affording sufficient explanation of some of the most common causes of a slight degree of lateral distortion of the spine; I shall now proceed to describe the Plates, that are offered in illustration of the changes which take place upon the skeleton in the several stages of this distortion.

NOT FOR CIRCULATION

Plate I.

Fig. 1.

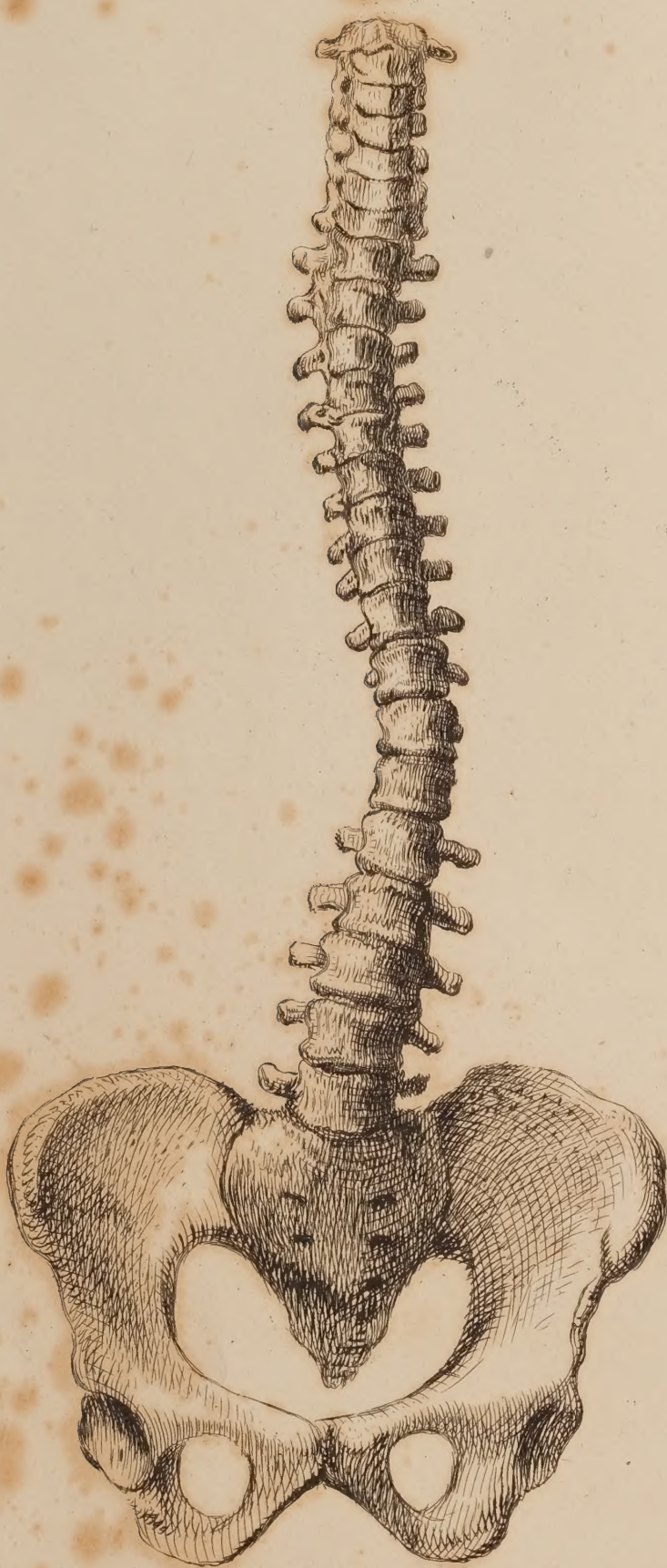


Fig. 2.

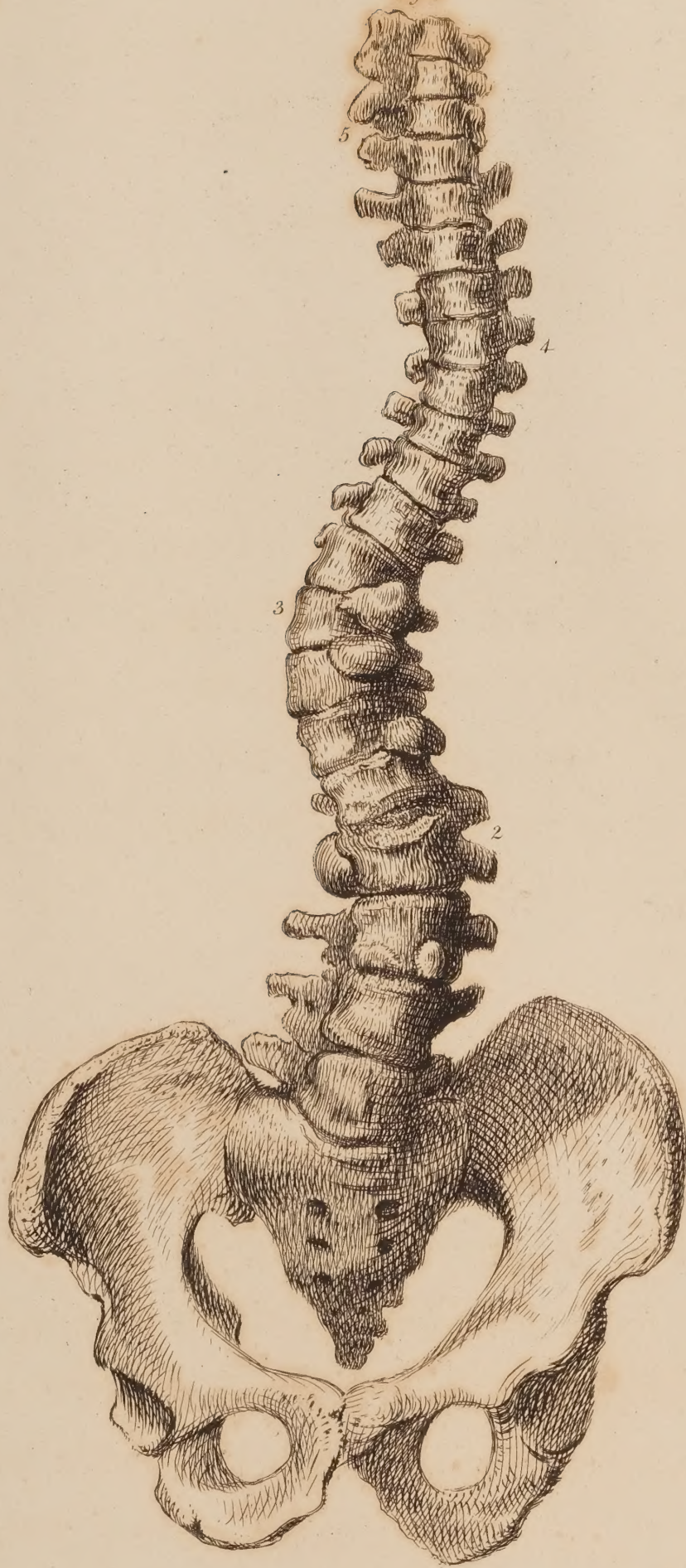


Fig. 3.

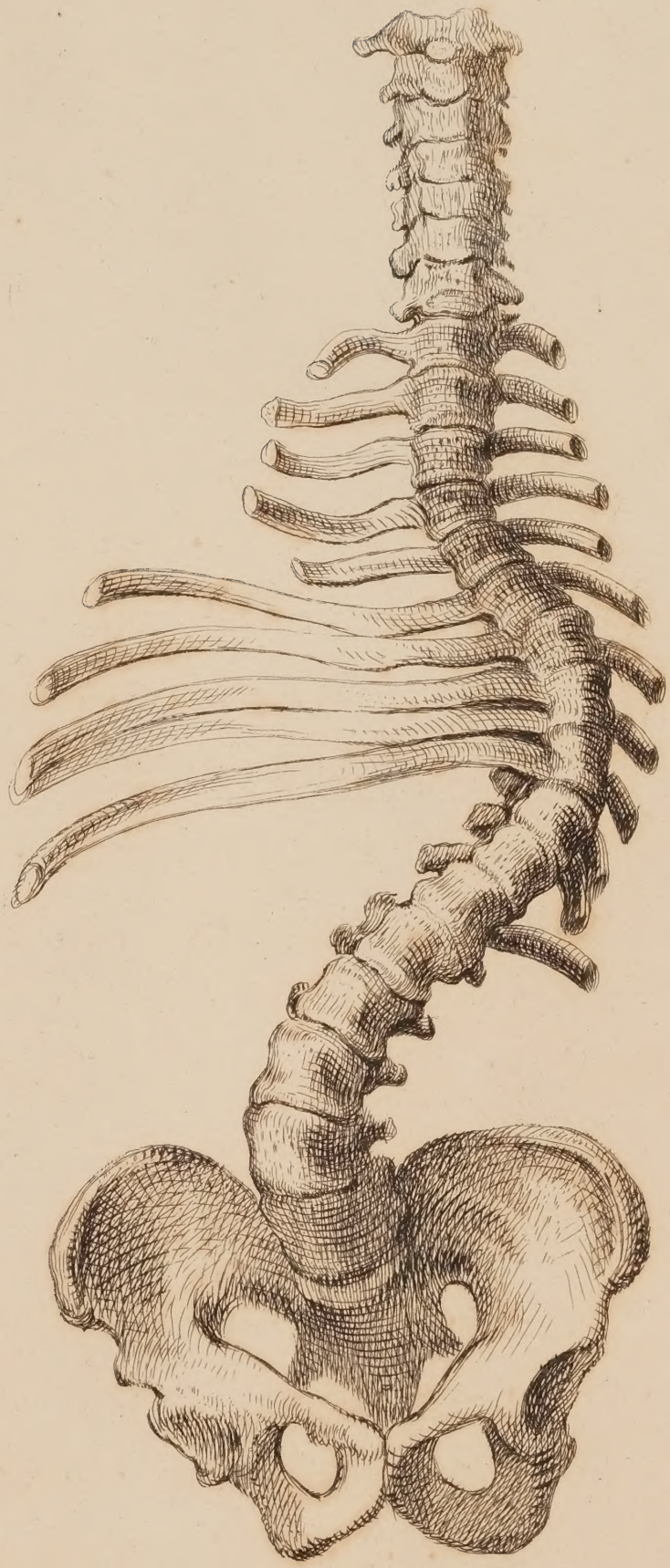


Fig. 5.



Fig. 4.

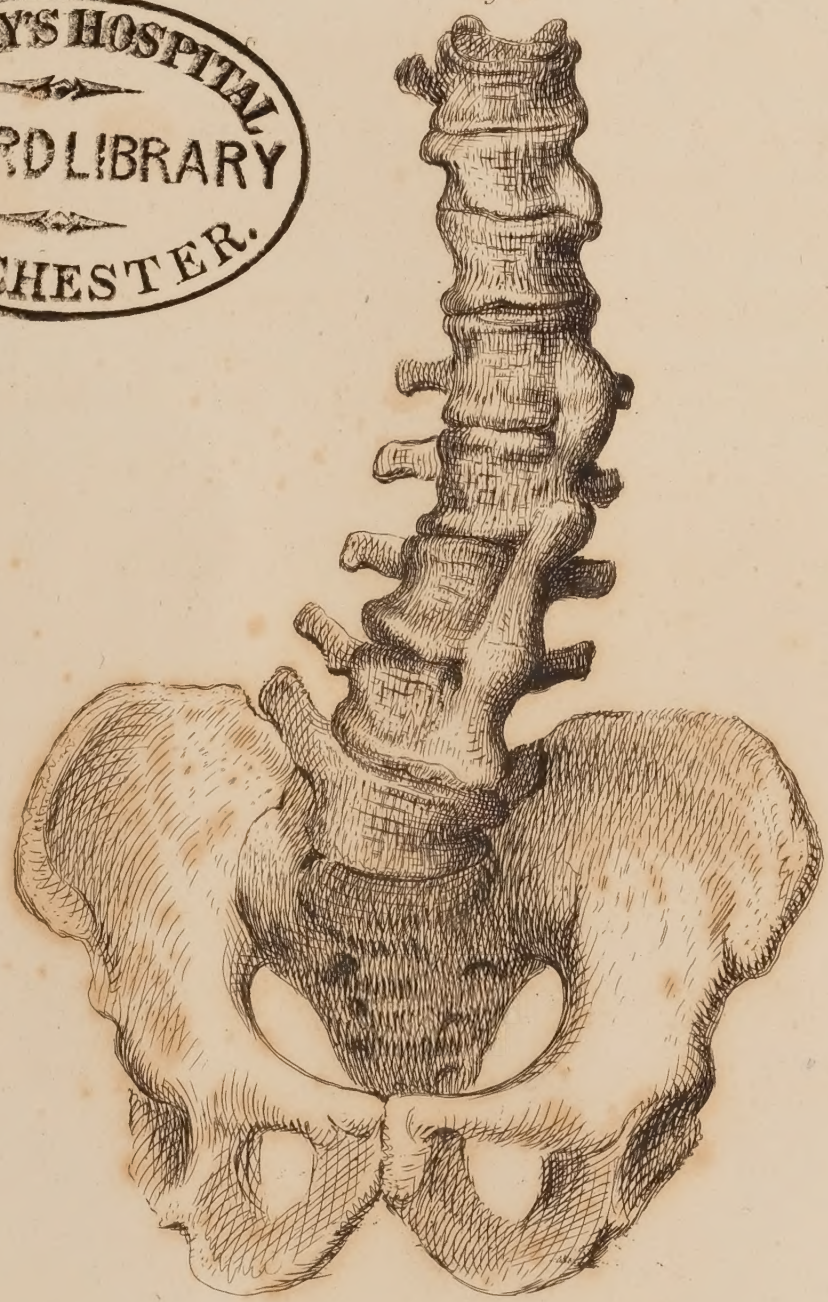
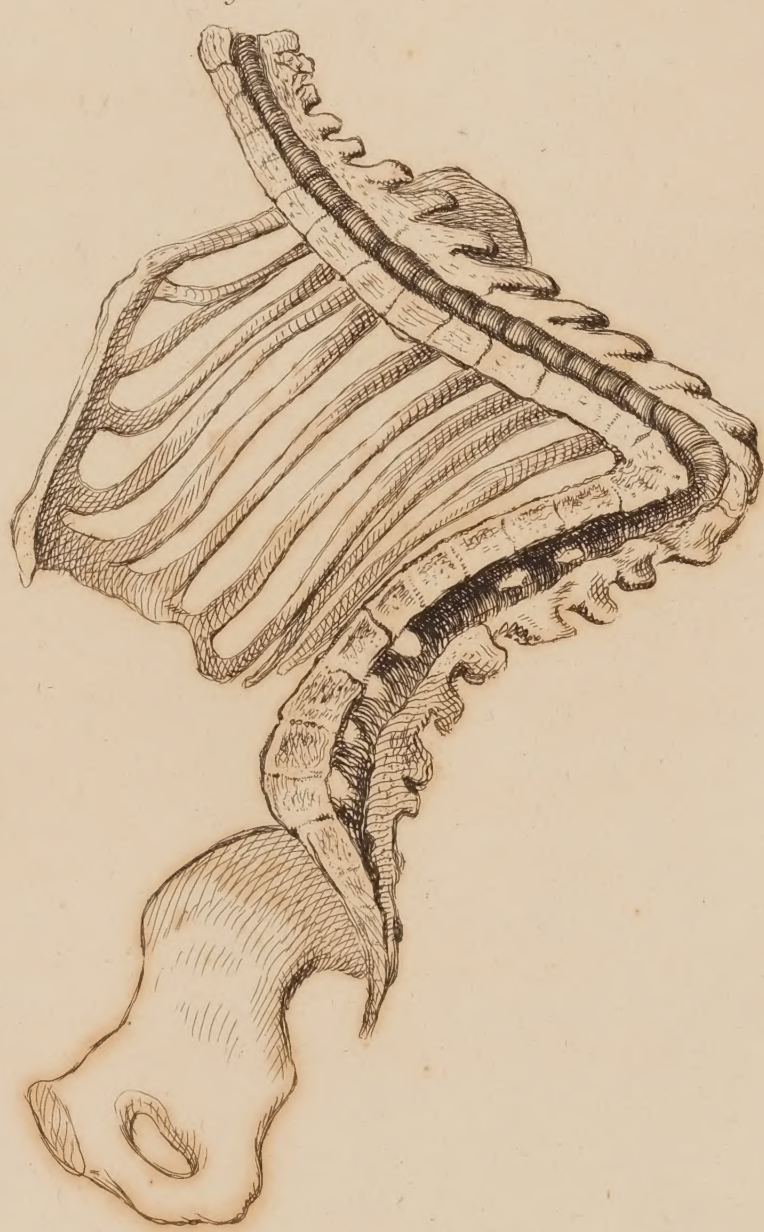


Fig. 6.



SEMARY'S HOSPITAL
RADFORD LIBRARY
MANCHESTER.

Drawn by A. Shaw.

Published by Longman, Hurst, Rees, Orme & Brown, London, 1823.

Engraved by T. Landseer.

DESCRIPTION OF THE FIGURES IN THE FIRST PLATE.

As the varieties in the form of the chest depend more or less on the state of the spine, the figures in this Plate are offered as examples of the different kinds of curvature to which it is subject. The effects produced upon the ribs and sternum by similar degrees of distortion of the spine, are demonstrated in the succeeding plates. The same figures also illustrate some of the morbid changes to which the vertebræ are liable, a knowledge of which it is absolutely necessary for a surgeon to have attained, before he can treat even the simplest case of distortion with safety to the patient.

The first figure forms a good illustration of distortion of the whole spine, although the change in the shape of the individual vertebræ is so slight as to be scarcely observable. From the third lumbar to the twelfth dorsal, the right sides of the intermediate vertebræ are deeper than the left. From the eleventh dorsal to the fourth, the inclination of the vertebræ is in the opposite direction, but still there is little difference in the size of the two sides of the bones. Such a change in the form of the column appears of little moment, when only the spine is examined; for as all the vertebræ above the fourth dorsal are nearly in a straight line, the upper part of the spine becomes almost perpendicular to the sacrum; but on comparing this figure with the sketches in the second Plate, the effect which even such a slight curve has on the form of the body is apparent.

As there is no mark of disease of the bones in this specimen, and as little change has taken place in their form individually, we may consider it as representing the condition of a spine, which, by properly directed efforts, might have been restored to its natural state.

The next figure affords an example of a deviation from the common degree of distortion exhibited in the first.

The first bend towards the left is very short, as a sudden curve takes place towards the right side, as low down as the twelfth dorsal vertebra.

This second curve is also more abrupt than is commonly found, especially in the space occupied by the three lowest dorsal vertebræ. At the seventh dorsal, the curve is again changed to the left, and continues up to the third, so that there is necessarily a slight curve in the cervical vertebræ, to bring the head into a line perpendicular to the pelvis. These curves may be compared with the diagram in the second Plate.

The appearance of a person with the spine distorted in this serpentine form, is different from that produced by a distortion similar to fig. 1. The four lower ribs on the right side are prominent, the next five or six on the same side are compressed together, and the two upper are rather elevated. On the left side, there is a contrary disposition of the several ribs; and hence it is, that when the spine is so curved, the shoulder is prominent, while the same side of the neck is flat; in such cases there is not the usual depression, but rather a fulness at the loin of that side, on which the shoulder is elevated.

Although the necessity of attending to the effects produced by this serpentine form of the spine is obvious, there are other practical questions illustrated by the preparation represented here. The lower dorsal and the upper lumbar vertebræ are not only much altered in form, but are also partially ankylosed; and even a considerable quantity of exostosis is thrown out on their sides.

Two circumstances most important to be recollected in the treatment of distortions, are proved by this condition of the spine; first, that in cases of curvature, a considerable degree of inflammation may occasionally exist in the vertebræ; and secondly, that it is sometimes impossible to cure even a slight distortion of the spine. The danger of a person, ignorant of pathology, attempting by violent means to restore a spine so affected, to its natural condition, is obvious. It is unnecessary to make any remarks on the consequences of an operator succeeding in his efforts to break through the ankylosis.

Although the third figure, at first view, appears similar to the two preceding, it is in many important points different. It is the spine of a skeleton in which all the bones were affected by rickets.

The projecting forward of the last lumbar vertebræ should be particularly remembered, as it forms one of the marks, by which the distortion consequent on rickets, may be distinguished from that produced by weakness and habitual bad posture.

But although this condition of the spine is to be considered as most frequently occurring in persons who are affected with rickets, it is sometimes found in a slight degree, in those who do not appear to suffer from any specific disease of the bones. In such cases, the curvature is known by the term *hollow-back*; and although it may in general be considered as a natural formation, it is occasionally produced by habitual bad position.

In patients affected with rickets, the distortion is generally confined to the lower part of the spine, but to this, there are many exceptions. The upper part is so little affected in this specimen, that on comparing it with the other figures, and especially with those in the second Plate, we might be induced to suspect that the shoulders had not been much distorted. Had the person not been ricketty, this would have probably been the case, as both scapulæ were nearly on the same level; but the deformity was very great, for the scapulæ themselves were mishapen, which never occurs except when there is a specific disease of the bones. Indeed, the circumstance of the figure of the shoulders not having relation to the form of the spine or ribs may be considered as a distinguishing mark of the distortion having been caused by rickets. In common cases of lateral curvature, the arrangement and form of the ribs correspond with the condition of the spine; but it is not so in rickets; for the ribs, being softened in common with the other solid bones, are mishapen in a very irregular manner by the action of the muscles attached to them, and by any pressure to which they may be subjected.

The Fourth Figure affords a good example of the curve beginning at the lower part of the spine, and continuing gradually upwards, in a manner similar to that represented in the first figure. In this specimen there is not only a curious provision to prevent the farther increase of the curve, but also a circumstance in proof of the impossibility of remedying certain cases, which, to a superficial observer, might appear to admit of cure. A splint or stayband of solid bone has formed on the convex side of the curve.

The Fifth Figure is introduced to shew the degree, to which the vertebræ in an old person may be ankylosed; the intervertebral substance is wasted, and all the bodies of the vertebræ are united together by ossific matter. It may be also taken as an example of the curve which is common in old age, and occasionally observed in young people, in consequence of an habitual stoop. This is particularly described at page 204.

As the distortion consequent upon disease of the bodies of the vertebræ, is often of a character that may lead those who are ignorant of pathology, to suppose that the prominence near the middle of the spine, is caused by displacement or dislocation of the vertebræ, I have thought it necessary to introduce the Sixth Figure, which is one of the many examples contained in the Museum, illustrative of the change produced upon the spine, by the disease generally called scrophulous caries. As the consideration of this disease will form the principal part of the next volume, I shall not enter into a particular description of the preparation represented by this figure; I merely offer it as sufficient to shew, that although certain vertebræ are prominent and altered in shape, the parts which form the boundaries of the cavity for the lodgement of the spinal marrow keep a proper relation to each other; so that the canal is free and regular in its form. The sketch also shews, that if the prominent vertebræ could be pushed inwards, the spinal marrow would be compressed by them; and that, consequently, if the person who promises to restore a spine in this condition, to its original shape, could succeed in pressing in the prominent vertebræ, he would kill his patient, by the violence necessarily produced upon the spinal marrow. Although the opinion generally entertained, that any diminution of the canal containing the spinal marrow is necessarily attended with paralysis, is incorrect, there cannot for a moment be a doubt, that any operation by which the boundaries of the canal could be suddenly diminished, would produce great irritation, and be followed by paralysis, and probably by death. The occasional good effects of the treatment, by which it has been pretended, that the situation of each bone forming the spinal column may be altered, have been fully considered in the accompanying volume.

Since the publication of that volume, several gentlemen have told me that I must be mistaken in supposing that it is not possible to alter the position of the individual vertebræ by pressure, for that they themselves had witnessed the operation, and the effect. Although I have much

respect for the talents of those gentlemen, I trust I shall stand excused in considering their evidence, only as a proof of the liability of even acute men, who have not made the subject a matter of anatomical research, to be deceived by the curious changes which may by various means be produced in the appearance of a spine which is not yet ankylosed. However, the arguments offered by these gentlemen have induced me to form a more charitable opinion of the operators; for they seem to be so entirely ignorant of anatomy and pathology, as really to believe that they can *push* a vertebra, which they consider displaced, into a new position, although we know that the utmost violence done to the spine may break but cannot dislocate a vertebra.

EXPLANATION OF THE FIGURES IN THE SECOND PLATE.

ALTHOUGH there is considerable variety in the form of the chest, in cases where the spine is slightly distorted, the first figure in this plate may be considered as affording nearly a correct representation of its shape, in the greater number of instances. The right shoulder is seen to be broader, and at the same time higher than the left; and the upper part of the right side is rounded and expanded, while the left is compressed and contracted. The causes of this condition of the shoulders and chest are demonstrated in the second figure. The expanded form of the ribs of the right side is seen to be a consequence of their rising from the convexity of the curve, while those of the left, being attached to the concavity, are depressed.

The effects which this condition of the ribs has on the appearance of the shoulders have already been so fully described, and the plate is so demonstrative, that it is unnecessary to dwell longer on them. It may however be remarked, that although in all cases of distortion, there is an inequality in the distance of the shoulder-blades from the spine, both scapulæ in fig. 2. are further removed than is found to be their situation in cases similar to that represented by the first figure.

This want of correspondence between the two figures may be objected to; but it would have been equally incorrect to have placed the scapulæ as they appear in the living body, since they are kept in a certain position by the action of their several muscles. The sketch is to be considered only as a *plan* of the effects produced on the ribs, and consequently on the shoulders, by a slight degree of curvature of the spine.

In cases nearly similar to that represented by the first figure, the space between the left scapula and spine is commonly about two fingers breadth, while the distance between the spine and the right scapula is at least four.

Although I have, in conformity with the received opinions, used the term *lateral curvature* in describing this condition of the spine, the name is



Fig. 1.

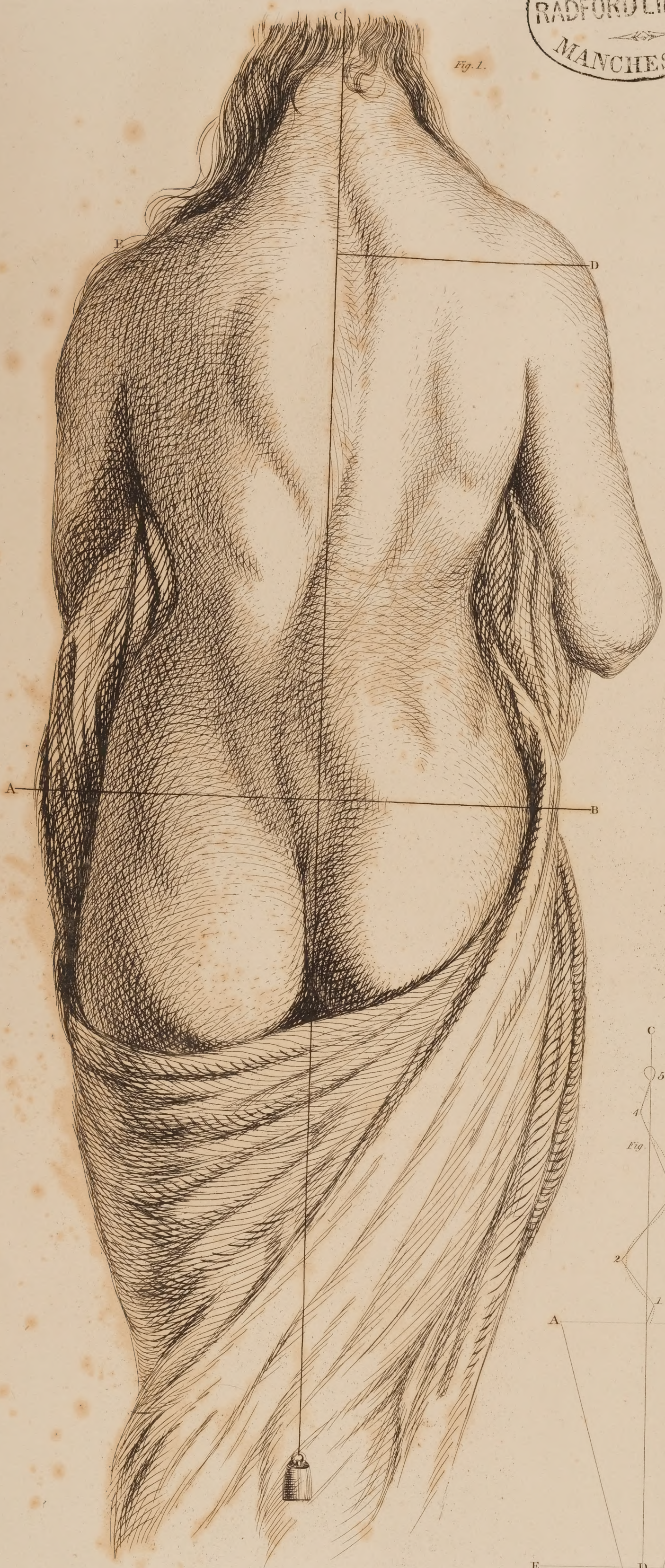


Plate II.

Fig. 2.

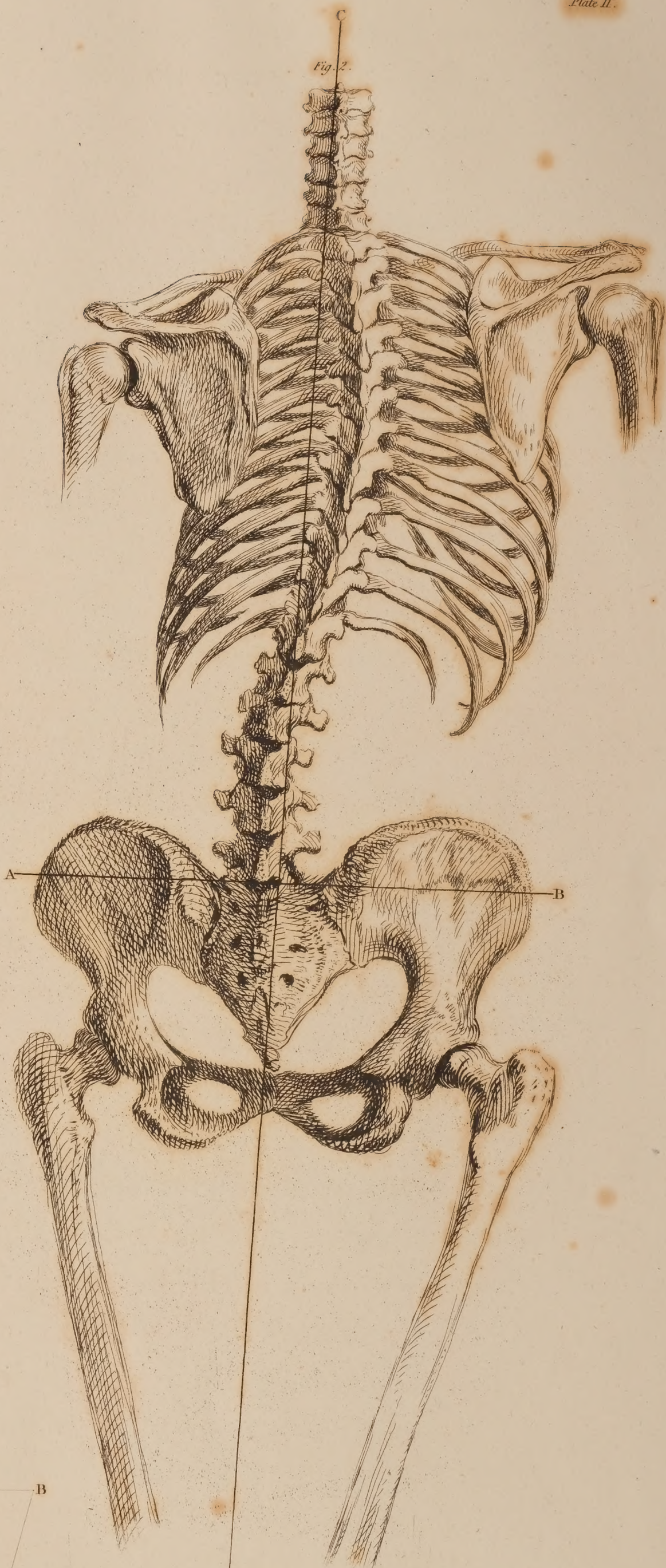
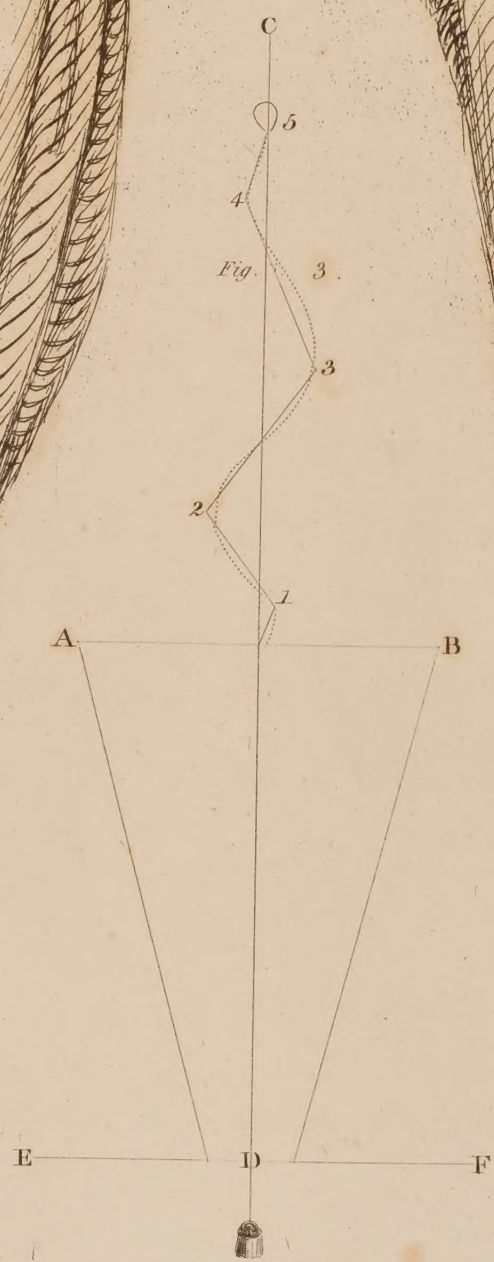


Fig. 3.





objectionable, since it leads not only to erroneous ideas on the nature of distortion, but also on the method of cure. The term *serpentine* is more applicable, for in all the cases which are generally described as lateral distortion, the curvature is more or less of this character. Even here, where the degree of distortion represented is very slight, the curve is serpentine; this however is more evident in the diagram, and especially in the second figure of the first Plate.

But although the term serpentine is more demonstrative than lateral, it is not descriptive of the real state of the vertebræ in such cases. In the skeletons from which several of the Plates are taken, the spine is not only curved from side to side, but so completely twisted round on its axis, that the bodies of the vertebræ are nearly in the situation of the spinous processes. The effect of a slight degree of this rotatory twist on the muscles between the shoulders, and at the loins, has already been described.

The demonstration afforded by the figures in this Plate makes it almost unnecessary to repeat that the cause of the "large and high shoulder" on the right side, and of the "hip being out" on the left, is not in any change that has taken place in the bones of the shoulder, or of the hip, but in the curvature of the spine. The sketches not only prove this, but that the enlargement of the upper part of the right side, depends on the manner in which the ribs project from the convexity of the curve, while the fulness in the left loin, is in a great measure, formed by the projection and twisting round of the transverse processes of the lumbar vertebræ. The sinking in of the right loin, and the straightness of the line from the left axilla to the left hip (as described at p. 4.) are not very distinctly marked here; but the causes on which these changes depend are sufficiently obvious.

It is a common opinion, that one leg is shorter than the other in cases of lateral distortion; this is incorrect, and it is important to shew that the difference in the length of the legs is only apparent. I shall, for the purpose of demonstrating this, compare the diagram in Plate A, p. 7., with the third figure in this Plate.

When the pelvis is inclined in the direction A B, fig. 3. Plate A, that is, when the body is balanced on the left foot, the right leg B I F is necessarily

bent, and consequently if brought parallel to the perpendicular C D, would appear longer than A D (the left leg), by a space equal to F L. If the pelvis were put in a similar position while a person lay on the floor, the right foot would for the same reason extend some distance beyond the left. It is thus proved, that by merely twisting the pelvis of a person whose spine is perfectly straight, one leg may be made to appear longer than the other.

But when the spine is distorted, although the general appearance of the body may be nearly the same as that of a person (whose spine is straight) while he stands on the left foot, the *right* leg will appear *shorter* than the left. However, if the distortion be very slight, the apparent difference in the length of the legs will not be very evident when the person is standing, although it is quite obvious when walking, and still more so when laid upon the back.

This may be easily explained. When a girl has only a slight distortion of the spine, (the lumbar portion being curved towards the left side,) she can rest fairly on both feet, as represented in the diagram 3. in Plate II. While she stands so, the two ilia are kept on the same level by the weight of the body, being nearly perpendicular to the middle of the sacrum; but when she lies down, the weight of the body has no longer any effect in keeping the pelvis straight. The right ilium is consequently turned up by the curve in the loins, and the right acetabulum is necessarily carried to a higher level than the left, as may be seen in the fourth figure of the third Plate.

That the apparent shortening of the right leg depends on the curve at the loins altering the position of the pelvis, may be demonstrated in two ways. If the patient be laid on the moveable plane, and the shoulders fixed, the curve at the loins may be made straight by pulling upon the lower board; both legs will then appear of the same length: but if the patient be laid on the carpet, and the curve at the loins increased by pushing the pelvis towards the shoulders, one leg will appear much shorter than the other.

When the curve at the loins is to a degree equal to that represented in the fourth figure of the third Plate, the right leg may appear shorter, even

when the patient is standing, because in such a case, the distortion is so great, that the central line of gravity does not fall so as to retain the acetabula on the same level.

The distortion represented in this Plate is often considered of little importance to a patient. This idea, which the patient and the friends are so ready to grasp at, arises from an opinion frequently expressed by surgeons of eminence, that if the general state of the health be attended to, a girl may outgrow such a degree of distortion. But there cannot be a greater mistake, nor one which may lead to more serious consequences to the patient.

Numerous cases might be offered in proof of this, and also to shew, that unless very great attention be paid, not only to the general health, but also to the local defect, the curvature, instead of diminishing as the girl grows up, will become worse. It must indeed be obvious to all who have attended to the subject, that if the disposition to curvature be not counteracted, in a girl growing at the rate of an inch, in two or three months, the new growth, instead of adding to the height, will increase the degree of distortion. Such I affirm to be the fact; and although this positive style may be objected to, those who have had opportunities of seeing the effects of the contradictory opinions that are given, on the nature and treatment of slight curvatures of the spine, will admit the propriety and even the necessity of such a statement.

I repeat, that a spine slightly distorted, and in a growing girl, may be made straight; but if it be neglected, (however great may be the attention to the state of the health,) the curve will become rapidly worse; and if it be permitted to increase to the degree of the ribs becoming angular, it is very doubtful whether a perfect restoration of the form can ever be effected.

In the accompanying volume, I have dwelt at some length on this question, but as even sensible people are easily flattered into the belief that a child may *outgrow* the deformity, I shall here offer unanswerable arguments to prove the necessity of even sacrificing some minor branches of education, to the endeavour to counteract a distortion of the spine, while in an early stage.

The arguments proposed, are sketches from skeletons of those who have been martyrs to the erroneous notions that have so long prevailed; and however extraordinary they may appear, the numerous instances daily seen in London, prove that cases similar to those represented here, are very common.

Fig. 1.

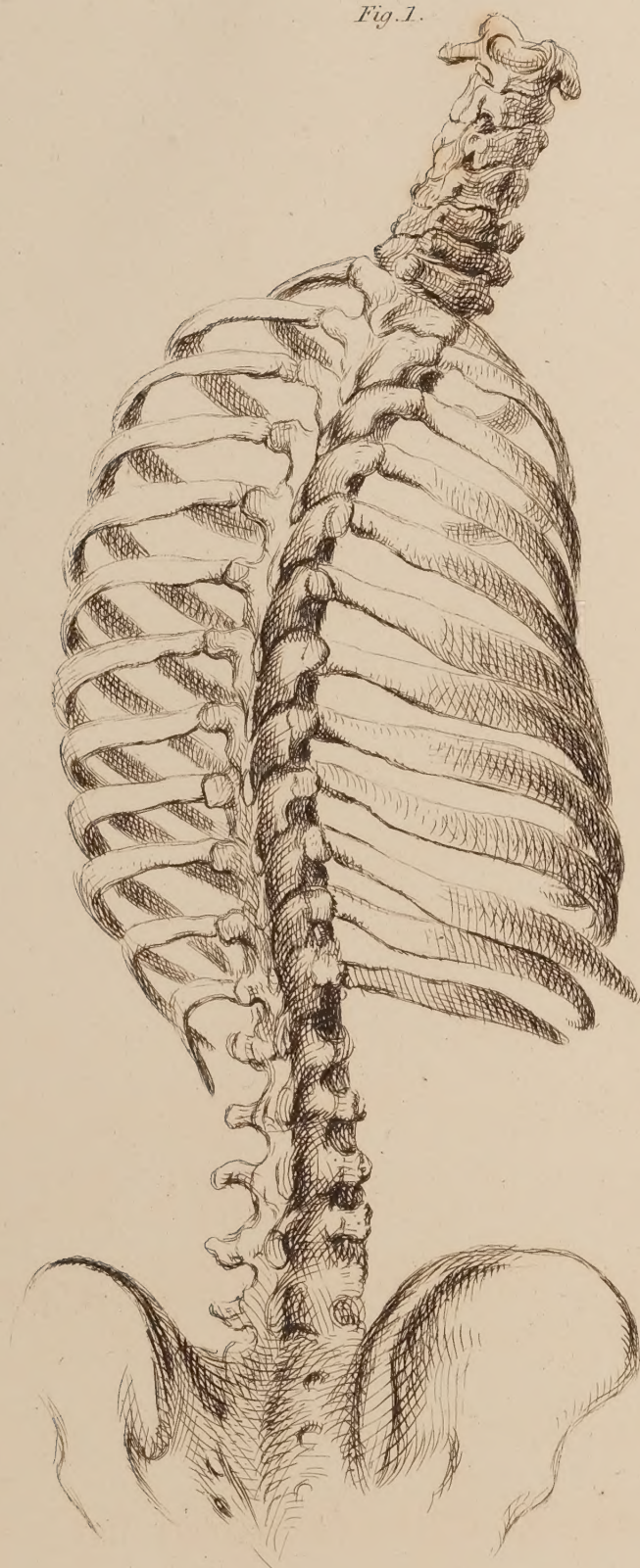


Fig. 4.



Fig. 2.

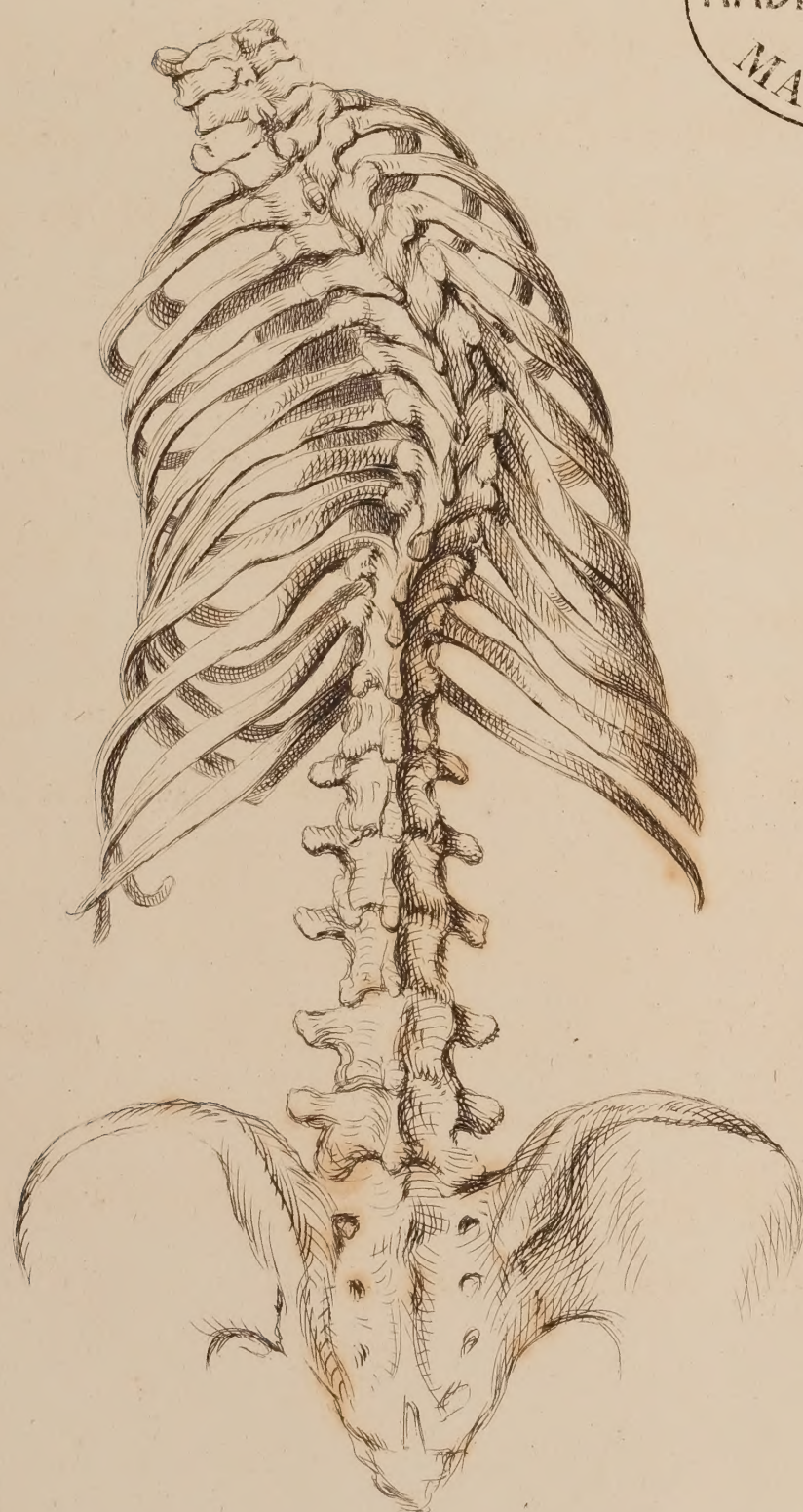
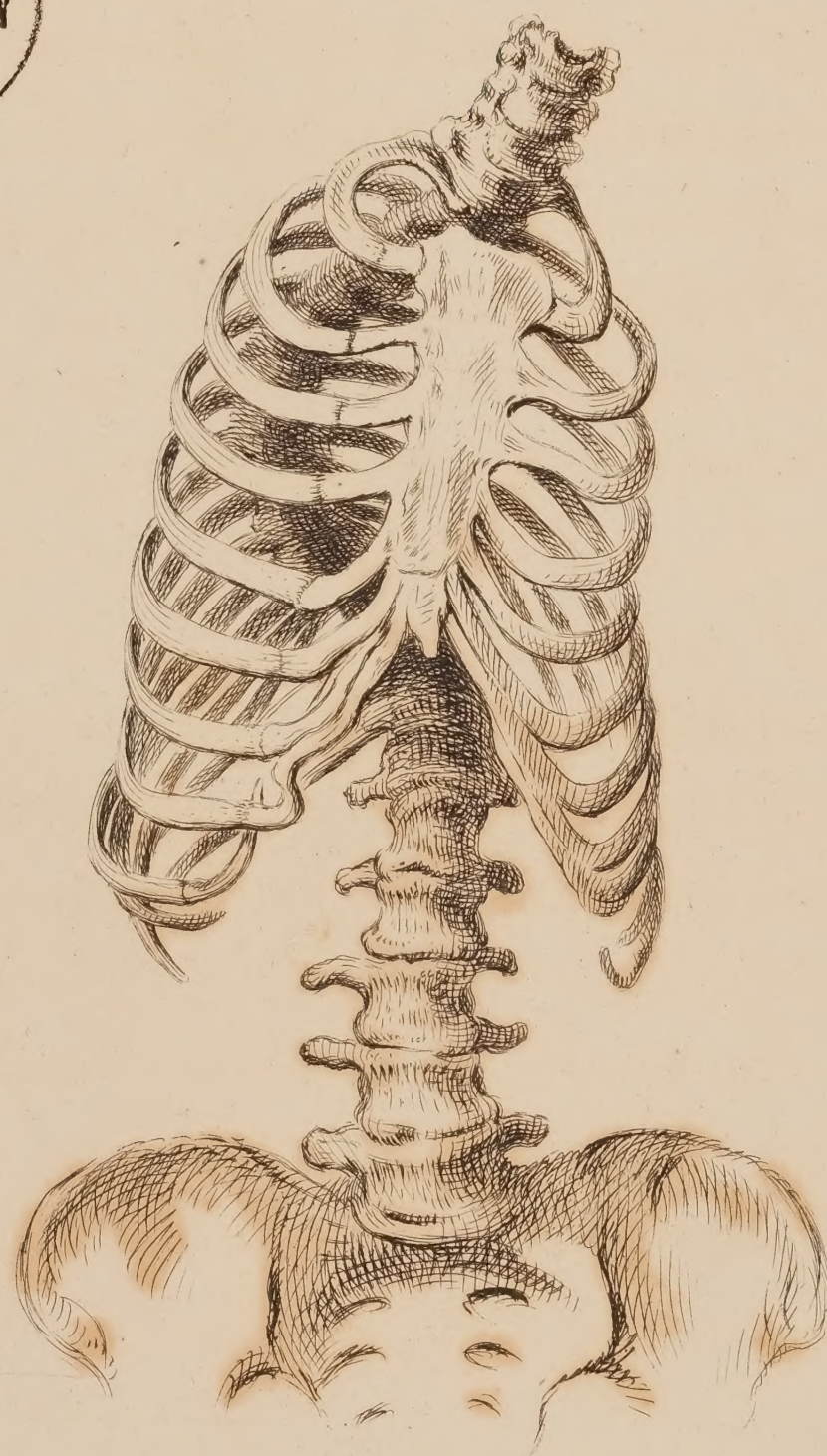


Fig. 3.



DESCRIPTION OF THE FIGURES IN THE THIRD PLATE.

THE figures contained in this Plate are illustrations of varieties of distortion, which, though less common than the case of lateral curvature represented in the last plate, are so frequent, as to be entitled to particular notice.

The First Figure represents a degree of lateral distortion, combined with the stoop which is liable to be formed by the continued habit of standing or sitting in a slightly-bent position. In this example, the left side is larger than the right; but in the greater number of cases, the right is the larger of the two.

It is easy to distinguish this species of curve from the common lateral curvature; for the head is not carried perpendicular to the pelvis, and all the ribs of the one side are expanded, while those of the other are confined, and the vertebræ are not twisted in the same manner as in the lateral curvature. On comparing this sketch with the preceding figures, it is evident that these effects are in consequence of the spine not being curved in a serpentine form.

This kind of distortion (but with the right side large instead of the left) is very common among persons who are in the habit of using the right arm more than the left, and are at the same time obliged to stoop. It is therefore most frequently seen in some workmen; and it may also be observed in girls who are short-sighted, and who from an early age have been accustomed to play on the piano-forte or harp.

The first mark of this deformity is a bend in the spine, a little higher than the middle of the back. The second is, both shoulders becoming rounder, and one a little higher; and the third is, that the same side of the neck as the high shoulder, appears to be fuller than is natural.

Elderly persons often have the spine distorted in this manner, but to a much greater degree, and especially if they have worn stiff stays or instruments to conceal a slight distortion. The cause of this is explained in the observations upon wearing artificial supports, in the chapter on the treatment.

In many such cases, ankylosis takes place between the bodies of the upper dorsal vertebræ. When this happens, the head is generally inclined in an oblique direction towards the left shoulder.

The First Figure is interesting in another view, having been taken from the skeleton of a person who died of disease of the lungs. It is referred to in the accompanying volume, where some observations are made on the mutual dependance of the lungs and muscles and bones of the chest. Although the various symptoms in dyspnea have frequently engaged the attention of ingenious men, there is yet a great field open for enquiry — and one, which, if cultivated, would perhaps repay the investigator, more than any other branch of physiology and pathology. The late discoveries of Mr. Charles Bell afford the means of solving most of the difficulties in which the subject has been hitherto involved. But as the enquiry would necessarily lead to a long discussion, I cannot enter upon it here, but only remark, that the distortion which follows the diminution of one side of the chest, in consequence of partial or total destruction of the lung, is essentially different in character from the cases already described.

The Second, Third, and Fourth Figures are intended to illustrate the changes produced upon the ribs, by the increase of the curvature of the spine.

The Second and Third Figures are examples of an unusual kind of deformity: the lumbar vertebræ are scarcely affected, the distortion having fallen almost entirely upon the dorsal, and of course very much on the ribs. It is easy to imagine how much more deformed a person appears with the spine in this condition, than when it is of a serpentine form; for the figure is taller, the difference in the size of the shoulders is very great, and the head, instead of being nearly perpendicular to the pelvis, is inclined to one side. On examining the condition of the bones in this example,

there can be little doubt that the distortion was originally similar to that in the upper part of a spine, affected with the common lateral curvature. We may therefore suppose that the right side was at first more capacious than the left. But the area of the right side is now much diminished. It is highly important to attend to this fact, for although it may be caused by the natural progress of the distortion, yet it often comes from the misapplication of instruments, which have been intended to push in the projecting shoulder. It is easy to demonstrate that the application of an instrument with this intention, not only diminishes the area of the chest, but increases the distortion; for the shoulder is pressed against the flat part of the ribs, and consequently the unnatural angle, which is formed in the ribs even in cases of slight distortion, is increased.

During the last six months, I have had ample opportunities of proving the correctness of these observations, (some of which have been already published in the accompanying volume,) and also that similar changes are produced in the form of the ribs by long confinement to one position; indeed it is obvious that the effect of the weight of the body continually pressing the shoulder against a hard mattress, while the ribs are growing, must be nearly the same as that produced by an instrument. I am at this time attending three patients who had, previously to my seeing them, submitted to a plan of treatment which has of late been very generally followed; viz. That of laying the patient on the back and making strong pressure on the shoulders and ribs. One had followed this plan for eighteen months, another for twenty, and the third for more than two years. I was told by the friends of each, that the spine was more straight and the shoulder not so prominent as when they commenced the plan; and that therefore, although there was still great distortion, and the patient was so miserably weak as not to be able to sit up, it had been of service. The sketches and the observations made in various parts of this work, are sufficient to shew that what may appear to a parent's eye an improvement, is in reality the reverse. Indeed the natural shape of the ribs was so completely destroyed in each of the cases alluded to, by the attempts made to push in the projecting shoulders and ribs, that I was obliged to limit my hopes to the ameliorating and rendering their condition more comfortable; the curvature, as far as the shape and figure are concerned, have become irremediable.

When the ribs are much distorted, the size of the chest is diminished, for the middle of the rib necessarily approximates the spine. This effect is demonstrated in the fourth figure, where we may also observe, that instead of the middle of the bodies of the vertebræ being in a line with the sternum, they are turned round so as to be nearly in the natural situation of the spinous processes. This is more clearly seen in the fourth Plate. It is scarcely necessary to dwell upon the length of the rib between the sternum and spine being probably diminished, as the fact is shewn in the third figure ; and it must be the case, when we consider that the spine is turned round, and that the head of the rib remains attached to the articulating process. On measuring the distance from the middle of the sixth rib to the spine, in the specimen of which fig. 3. is a sketch, I find it to be an inch and a half, while the distance between the same points, in the skeleton of a well-formed person, is more than five inches. The effect which such a distortion may have upon the heart and lungs, may be imagined.

Although it will perhaps be admitted, that the sketches contained in this volume, afford examples of the condition of the spine and ribs in the greater number of cases of distortion, there are many instances which differ in some respects from those represented here. The description just given of the changes which take place in the size of the sides of the chest, is correct upon the whole ; but where the distortion originally proceeds from disease of the lungs, the state of the chest may be different. In a case at present under my care, in which the spine is twisted in the opposite direction to that represented in the second and third figures, the right side of the chest (which, as far as it regards the condition of the spine, is similar to the left in the second and third figures,) instead of being more capacious than the left, is six inches less ; the measurement between the spine and the sternum being on the one side twelve inches, while it is eighteen on the other. Indeed, that side of the chest which in common cases of bad distortion is the larger of the two, is so collapsed, and so completely inefficient as a respiratory organ, that even the muscles are scarcely discernible. The cause of its destruction is fairly attributable to an abscess in the lungs at an early age, and for which it was necessary to perform the operation of paracentesis thoracis.

The Fourth Figure is a back view of the skeleton which is represented in the Fifth Plate.

It is unnecessary to say that a distortion, such as that represented here, is irremediable ; but certain points, which have been often misunderstood, are so strongly marked in the sketch, that it will perhaps help to prevent us from committing mistakes in the treatment of cases where the distortion is in a slighter degree.

I have seen a machine-maker, who is considered to be well acquainted with his business, make two serious mistakes while examining a person distorted in this manner.

He in the first place mistook the projection of the right shoulder for an enlargement of the scapula and of the ribs ; and to remedy this, he wished to apply firm pressure with an iron plate. Had this plan of treatment been acceded to, the ribs must have been farther distorted. The next mistake he made, was to believe the projection formed by the angle in the ribs to be the spine ; and this, he of course proposed to make straight. The latter mistake is very often committed, at least, the projection formed by the acute angle in the ribs, has been frequently pointed out to me as the spine. We cannot be surprised that an ignorant person should fall into this error, for the ribs sometimes project, and the scapulæ are so approximated that the spine itself is almost hid.

In the preface to the accompanying volume, and in several parts of the work, I have endeavoured to shew the danger to which patients are exposed, when entrusted to the treatment of those who are ignorant of anatomy and pathology. But here, even at the risk of being supposed to allude to some gentlemen for whose attainments in surgery I have the greatest respect, I feel it a duty to protest against a mechanic being sent to apply such instruments as he considers proper, to push in the projecting shoulder or ribs.

The danger of attempting to repress the prominent ribs must be obvious on the examination of the Plates, and I could give several instances where patients have been rendered absolutely miserable by the application of machinery, who, although much distorted, might have been made comparatively comfortable. In a case to which I have already alluded, where the right side was collapsed, in consequence of abscess in the lungs, and the patient could only breathe by the left, it was proposed that the

projecting ribs on the left side should be repressed. When this advice was given, it must have been forgotten that the area of this side, in which the heart and all that remained of the lungs were lodged, was already diminished by the angular form of the ribs. An instrument-maker was sent to effect the purpose recommended, and being an ingenious man, but ignorant of the structure of the body, would probably have done his part of the business so effectually, as to compress the ribs in such a manner, that neither the heart nor the remaining lung could have acted. I was so fortunate as to rescue the patient from this additional torture and danger.

My principal object in introducing the figures in this Plate, is to demonstrate the changes the ribs undergo in distortion of the spine, and which every day's experience proves, have scarcely been attended to; but I may again refer to the cause of one leg appearing shorter than the other, and of the peculiar gait which may be observed in persons who have distortion of the lumbar part of the spine. The right acetabulum in the fourth figure is seen to be on a much higher level than the left, the consequence of which, as has been already explained, must be the apparent shortening of the right leg. It is almost unnecessary to remark how much the actions of the psoæ and iliac muscles, by which the body is carried forward, must be deranged, when the parts where they originate are distorted like the specimen represented here.



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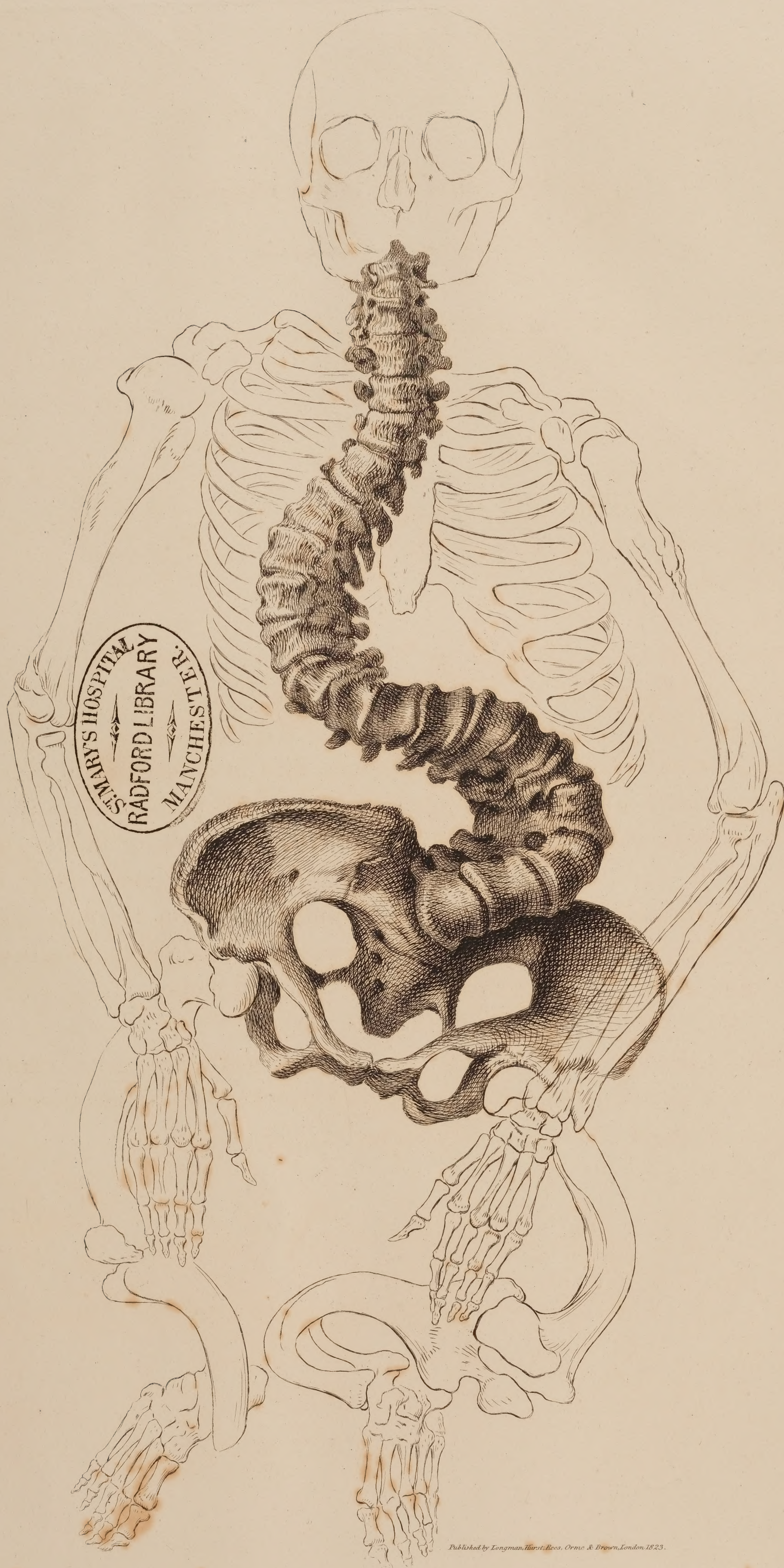
EXPLANATION OF THE FOURTH PLATE.

THIS Plate is offered in illustration of several important facts which are dwelt upon in the accompanying volume ; but perhaps the most interesting point of view we can take it in, is as exhibiting the degree to which a person may become distorted, who is in the first instance affected in a similar manner to the sketches in the second Plate. With such an example before us, we need not insist upon the importance of attending to a case of distortion at its commencement. It may perhaps be said, that this is a specimen of distortion consequent on rickets ; but I trust that the arguments offered in the other volume, are sufficient to shew, notwithstanding the opinions generally received, that the spine and ribs may be distorted to a similar degree, without the osseous system being *specifically* affected.

It is scarcely possible to imagine how the functions of the viscera of the abdomen and of the thorax can be performed, when the bones are distorted in a manner similar to this specimen. The space between the first dorsal vertebra and the symphysis of the pubes is only twelve inches, while the breadth of the chest at the widest part is only seven : and yet the person from whom this was taken, lived nearly to the age of fifty, and died of apoplexy. Although the viscera in such cases perform their functions much better than we could *à priori* suppose, yet patients even slightly deformed, occasionally suffer from symptoms of disease, which may deceive those who have not attended to the changes that must occur in the position of the viscera. As these are particularly referred to in the chapter “ *on the effects which distortion of the trunk produces on the viscera,*” I shall not make any further remarks on them here ; but I would beg my reader to compare the capacity of the side on which the ribs rise from the concave part of the curvature, with the description which is given in the explanation of the last plate, of the condition of the chest, where one side has collapsed in consequence of the destruction of the lung by abscess.

It can scarcely be believed that any man possessed of common sense or honesty would promise to restore a spine so distorted, to its original and natural form; yet on several occasions, I have been consulted by patients who had been flattered by promises that the distortion might still be cured, and have submitted to a treatment which is not only cruel, but even dangerous, and always renders the condition of the patient much worse. I hope that the state of the spine and ribs as represented by the Plates in this volume, will be sufficient to shew the inutility as well as the danger of attempting to press in the projecting shoulder or ribs, or even to stretch the dorsal part of the spine in such cases. It has indeed astonished me, as I know it has others, that the windlass and the pullies employed to stretch the spine, have not sometimes destroyed the patient, for it generally happens when the spine is distorted in a manner similar to the specimen represented here, that there is anchylosis, either between the vertebræ or the ribs.

But although we cannot promise to restore the shape of persons so distorted, much may be done for their ease and comfort. The history of a case shewing the consequences of not endeavouring to remedy a distortion at an early age, and the good effects resulting from a particular plan of treatment, even after the spine is distorted to the degree represented in the Plate, is given at p. 257.



EXPLANATION OF THE FIFTH PLATE.

ALTHOUGH the distortion of this spine has a certain resemblance to that represented in the last Plate, the two cases differ most essentially from each other. In this instance, the curvature of the spine was caused by rickets, or was at least accompanied by a ricketty condition of the cylindrical bones. The manner of distinguishing the case where the distortion is independent of rickets, from that which is not, and the importance in a practical view of making the distinction, are stated in the accompanying volume.

The sketch is so faithful a representation of the condition of the skeleton, that it is unnecessary to describe it particularly. The pelvis is affected, although not so much as it frequently is, in cases where the distortion depends upon rickets; however the woman died in child-bed. The skeleton measures from the top of the head to the heel $31\frac{1}{2}$ inches; from the angle of the jaw to the pelvis only 12 inches; from the sternum to the spine, $4\frac{1}{2}$ inches; the breadth of the chest being more in proportion, viz. $7\frac{1}{2}$ inches. The measurements of the pelvis are; from the sacrum to the os pubis, $2\frac{1}{8}$ inches; from the prominence of the os coccygis to the pubes, 3 inches; from the brim of the one ilium to that of the other, $4\frac{3}{4}$ inches.

The skull is not much affected, and the teeth are quite sound; the scapulæ are considerably distorted. The sketch gives an accurate idea of the condition of the bones of the arms and legs.

EXPLANATION OF THE SIXTH PLATE.

THIS Plate contains sketches of the instruments which are at present most commonly used in England, with the intention of curing distortions of the Spine. All the machines, except that represented by fig. 1, I have received from patients who had worn them for a considerable time.

Although it is easy to satisfy a reasonable and sensible parent of the absurdity of the promises made by one set of charlatans, it is sometimes difficult to convince them of the inutility and even of the danger of machines as they are commonly used. The makers of these instruments are often ingenious men, who can talk in a specious manner of their contrivances; and indeed, such is the variety of distortions, that the mechanist can sometimes bring forward proofs of the efficacy of his instruments; if he can do this, it is not surprising that he should promise that every distortion may be cured by machinery, for he is not aware that cases apparently of the same nature are often essentially different.

Having sometimes found, when I first attended to this subject, that the promises made by mechanists, especially if supported by a display of curious and ingenious springs and screws, had considerable influence on the minds both of the patient and of the friends, I was induced to make a collection of all the instruments that have been used in England within the last thirty years, for the purpose of curing distortion of the spine. An enquiry into the merits of those at present employed, would probably be useful; for as long as there is no settled principle of practice for the treatment of distortions, it is natural for the patient, and even for the surgeon, to have recourse to the aid of a machine, by which a certain effect may be produced. The enquiry is the more necessary, as it has generally happened that as soon as an instrument was proposed, the patient was given up to the care of the mechanist. We cannot be surprised at this; for if the surgeon, who gives it as his opinion, that the application of a complicated instrument is the most likely means of curing the distortion, has not some knowledge of mechanics, he is very liable to be driven out of the field by

Fig. 5.

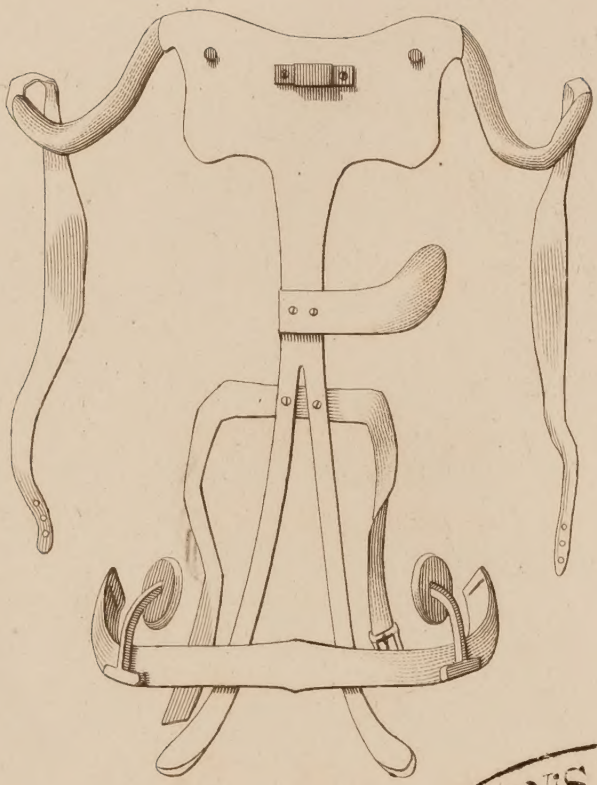


Fig. 4.

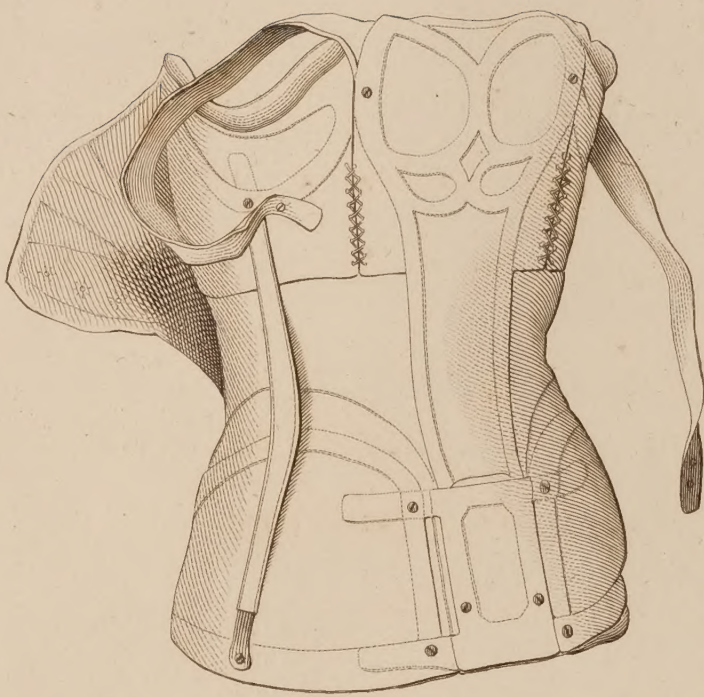


Fig. 6.

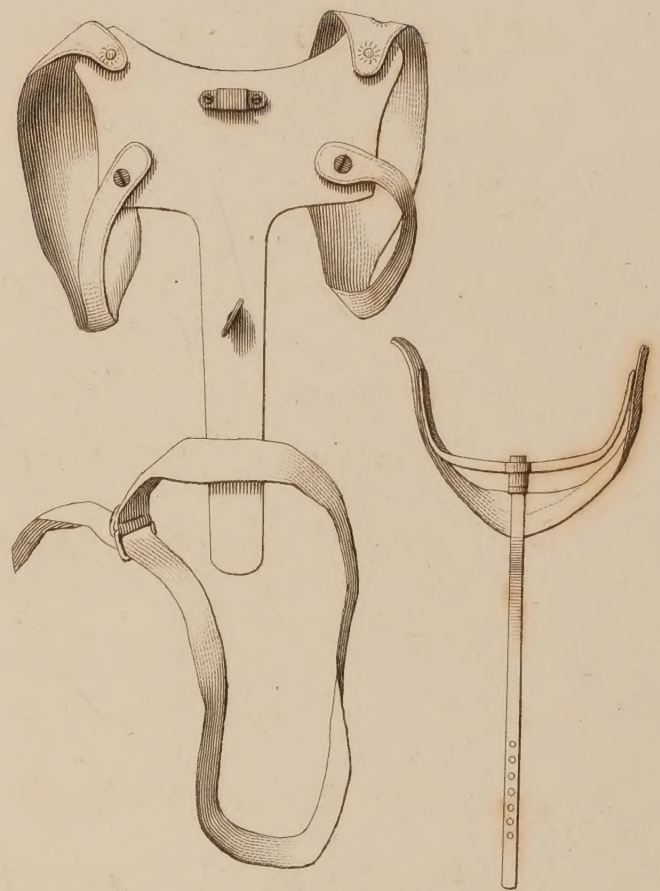


Fig. 1.

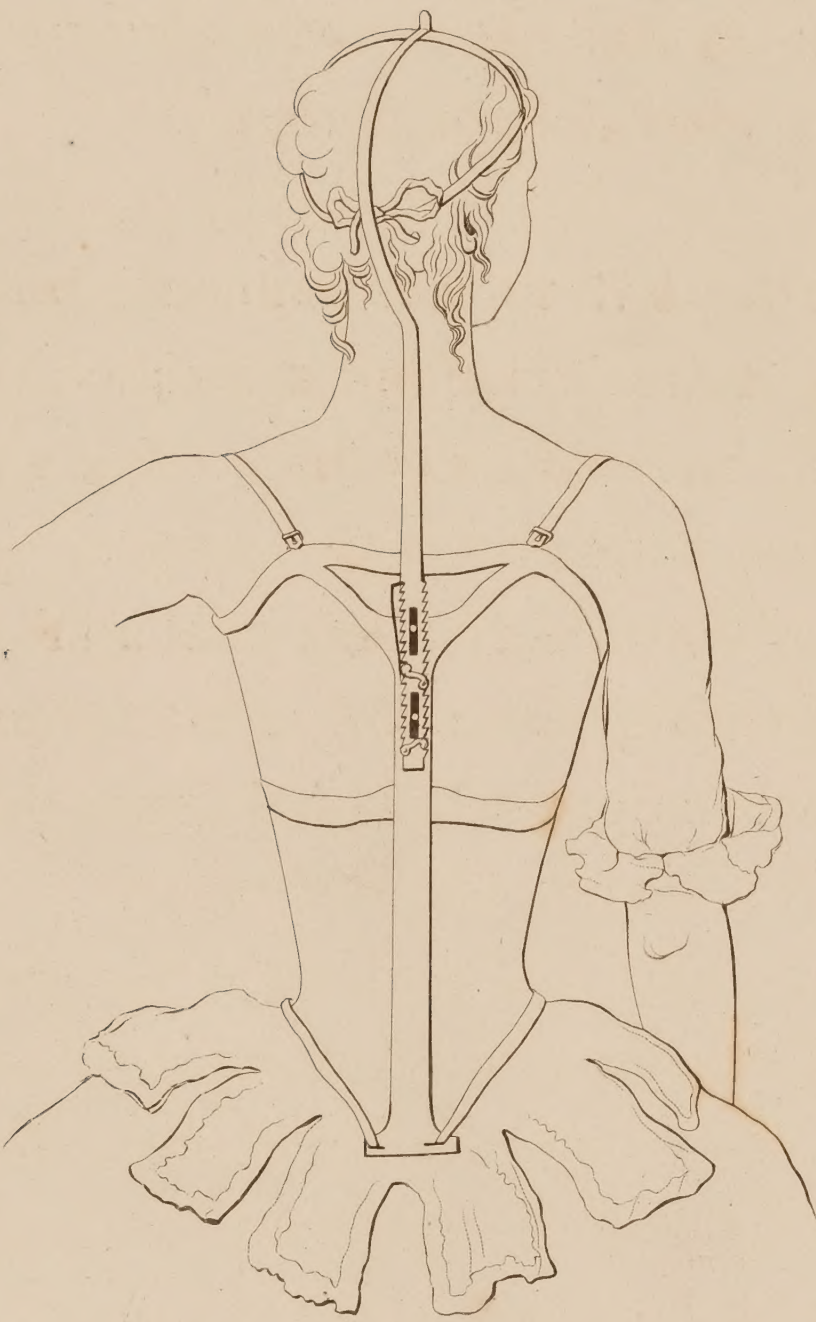
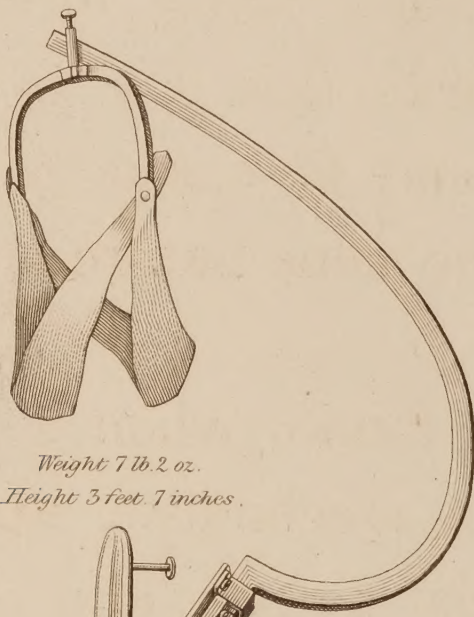
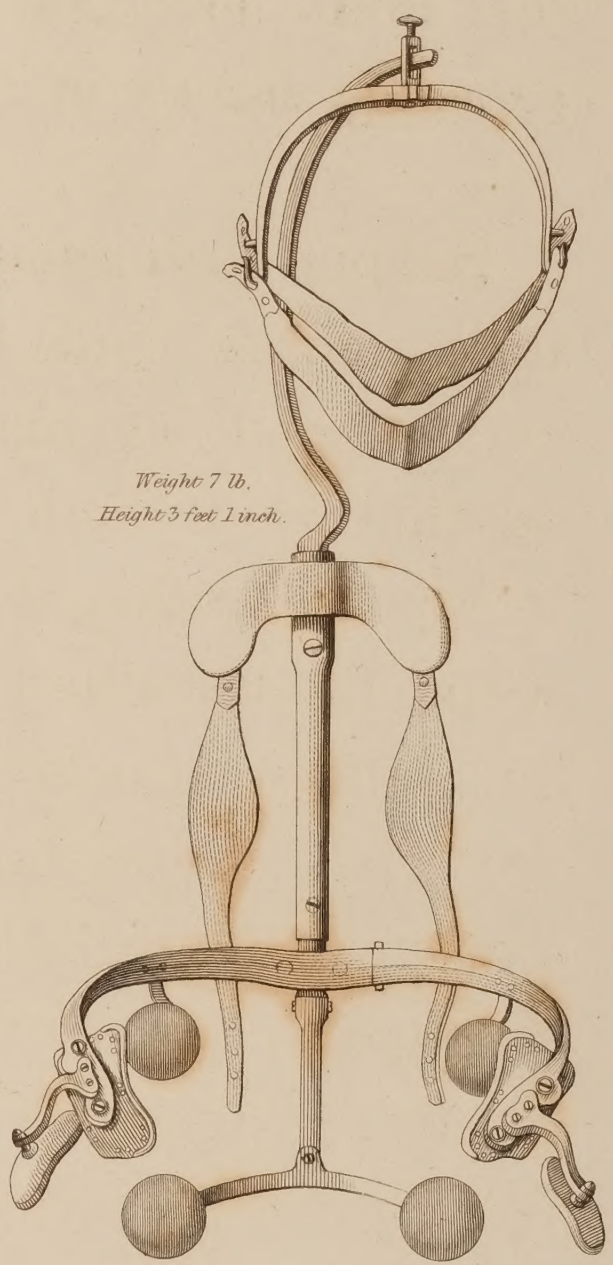


Fig. 3.



Weight 7 lb. 2 oz.
Height 3 feet 7 inches.

Fig. 2.



Weight 7 lb.
Height 3 feet 1 inch.

the mechanist, who not only puzzles him with a farrago about screws, purchases, and powers, but gains the confidence of the patient, by his greater manual dexterity, and by the bold assertions which he makes without hesitation, of what he can do with his instruments.

FIG. 6.

The use of this instrument (the common back collar) has been so long established, that strong proofs of the bad effects of wearing it must be offered, before a mother can be brought to consider it otherwise than a necessary piece of dress. Such proofs, I trust, will be found in the accompanying volume; here, it may be well to repeat, that although the shoulders are kept back while the collar is applied, they are after a certain time more liable to fall forward, than they were previously to its use, as the muscles by which they are naturally held back, become gradually weaker from want of exertion.

The same observations apply to an instrument lately invented, called an aid-form, and indeed to all those which are commonly used to hold back the head and shoulders. The additional contrivance which is often applied with the intention of giving a good position to the head, is placed by the side of fig. 6, to which it is meant to be fastened by a bracket and screw. This instrument is useful in particular cases, but nothing can be worse calculated for the purpose it was originally intended, as by wearing it, a complete stop will be put to all the natural actions which strengthen the muscles that support the head in an erect posture.

FIG. 5.

Is the sketch of an instrument which is at this moment in very general use in London. If this machine were to be used only on particular occasions, and when the patient, regardless of the pain it produces, was anxious to conceal a slight distortion of the spine, it would perhaps deserve all the encomiums that have been passed upon it, and the maker would be justified in asserting, upon the authority of an eminent surgeon, that "it should not be considered as a *machine*, but as a pair of stays in which ladies might go to court." But, unfortunately, it is recommended by the same authority, as the only means necessary for the cure of distortions of the spine.

Several objects are proposed to be effected by this instrument; first, to pull back the shoulders; the observations that have been made on the *back-collar*, render it unnecessary to say more upon this; secondly, to push in the projecting shoulder by an iron plate; the effects of doing this are sufficiently dwelt upon, in the description of the condition of the distorted ribs; it is also unnecessary to make any remarks on the consequences of the pressure by the piece of iron which projects from the middle of the upright. However, the changes that may for a time be produced by this machine, upon the appearance of a child with distortion of the spine, after its joints have been supplied by rubbing and working them with the hand, are so great and so immediate, that a mother who is ignorant of the real cause of the deformity, and of what is done to conceal it, may be led to suspect that the above observations are founded on prejudice. This is the more likely to happen, as the people who propose to cure distortions by complicated instruments often accuse surgeons of malevolence, while they screen themselves, by declaring that they cannot be responsible for the effect, if their machine is not worn constantly for many years.

As minor objections to the use of this instrument, it may be stated that as the irons which support the shoulders are fastened to the back-plate, they cause a great deal of pain if not properly fitted. And if the instrument be accurately made, it is obvious that the chest cannot increase in size. In instances where this instrument had been worn for some time, I have found the pectoralis muscle wasted, and nearly cut through, at the part on which the shoulder-straps press.

FIG. 4.

This instrument, which was made in Edinburgh, forms so complete a case for the chest, that when it is applied, neither spine, shoulder-blades, nor ribs, can be seen or felt. When the sole object is to conceal the defects of the shape, it may be very useful; but the same objections are applicable to its being used for the purpose of curing a distorted spine, as have been made to the two preceding instruments. It might be improved by placing the head of the crutch on a pivot, and by taking away the leather which covers the whole apparatus. So much heat is occasioned by the leather, that the young lady from whom I received the instrument, was obliged to put it off during the summer months.

FIG. 1.

This figure is copied from the sketch of the instrument given by Portal in the Academie des Sciences, and is nearly the same as that invented by Le Vacher, from which the instruments known in England by the names of Jones and Sheldrake's collars are copied. The mechanism of the instrument represented here, is very simple, and is on that account superior to those very ingenious pieces of machinery which have been considered improvements on it.

This machine may give occasional support to a deformed person, but nearly the same objections apply to the proposal of using it as the sole means necessary for the cure of a distorted spine, as will be offered in the description of the two next figures.

FIG. 2.

The instrument represented by this figure, is that generally known by the name of the *Hinkley Collar*. Its merits are particularly enquired into in the accompanying volume.

In the application of this instrument, the circular part with the pads is fixed to the pelvis, and when the body is elevated to a certain height by pulling upon the head-piece, with a cord over a pulley, (the straps being under the chin and back of the head) the upright bar is fixed. As there is no elasticity in this bar, nor any provision for its being elevated or depressed, in correspondence with the motions of the body, the head must invariably be kept at the same distance from the pelvis; and as the head is forcibly elevated before the application of the instrument, great part of the body must be hung as an appendage to it, since the whole weight is supported by the straps under the chin and back of the head.

Much pain necessarily attends the operation of the instrument, when it is applied in the manner supposed to be necessary to stretch the spine. But the strongest objection to its use, is that there is no longer any exercise of those muscles, by the action of which the spine is supported in a state of health; in consequence of this, the muscles become gradually weaker, and every day the less able to support the spine.

Indeed we find that after the instrument has been worn for some time, either it, or a machine similar in effect, becomes indispensable to the patient's comfort, unless the spine has become a solid and immoveable column, by the process of ankylosis. The objection most commonly made to the use of the machine, is the danger of the bones of the pelvis being compressed, and of the natural openings being diminished, from which the most serious consequences may result, when the patient arrives at a certain age. This has been particularly dwelt upon in the accompanying volume, and the proofs offered there, will perhaps be considered sufficient to shew that the dread of the pelvis being distorted, in cases of common lateral curvature, by the application of instruments, is groundless. But even the inventors of these machines have fallen into the common error, and the fear of hurting the pelvis, has been the source of much of the complicated machinery connected with that part of the *collar* which is fixed upon the pelvis; the additional supports being intended to make equal pressure on its different parts. The third figure may give some idea how much this must add to the patient's suffering.

In children, the bones of the face are liable to be distorted by the use of this machine, and even in grown-up persons, the teeth are sometimes displaced; however, the effects upon the bones of the face are not so bad as is generally supposed, but there can be no doubt as to those produced by the straps on the muscles of the face, and on the skin below the chin. By the pressure, the muscles of the cheeks are wasted, thus increasing the feature so characteristic of deformity; and from the same cause, the skin of the chin, after being repeatedly ulcerated, becomes at last hard and thickened.

This wasting of the muscular flesh is not confined to the face; for the muscles, at all the points on which the machine presses, are so liable to be absorbed, that in some patients, there is absolutely nothing to be felt between the skin and the bones. This effect is liable to make persons believe that the machine is doing good. The swelling in the left loin, which is particularly described in the explanation of Plate II., is in part produced by the muscles which lie upon the transverse processes of the distorted vertebræ. After the machine has been worn for a certain time, these muscles waste, and the swelling is consequently diminished; but such a change should be considered disadvantageous, and as a proof of the diminution of the power of the muscles by which the spine should be supported.

One of the advantages alledged to be gained by wearing this machine, is, that it presses in the protruding shoulder-blade. To one ignorant of the changes which the ribs undergo in lateral curvature, this may appear to be an advantage, but by examining into the cause of the protrusion of the shoulder (as exemplified in the plates), the bad effects of any attempt to push in the shoulder will be evident.

In several patients who have worn this machine, I have observed a sinking in or depression of the dorsal part of the spine, which produces an unnatural degree of hollowness between the shoulder-blades. This must be referred to the use of the instrument, as it is seldom seen, except in those who have worn it, or some one similar, which presses on the same points.

Are patients frequently cured of lateral curvature merely by wearing such machines?

The first difficulty which we have to encounter, is that the proofs of the efficacy of the instrument are generally offered by those who are not aware that there is a great variety in the affections of the spine. I shall therefore at once admit that many patients may have been benefited by merely wearing the collar; that they may have felt stronger, and have got into better health; that perhaps they may have become straighter, and, after having received the most marked benefit from its use, have been enabled to give it up, and still continue well and comfortable. But the following questions may be put.

After a girl who has lateral distortion of the spine has worn the instrument for one or two years, is her spine straight, and at the same time so elastic and mobile that she can stoop or move from side to side with the same degree of freedom as other girls? If the spine has not become stiff and almost fixed, can she sit or walk without the assistance of strong stays or some similar contrivance?

In answer to these questions, I could offer instances of persons who are still wearing the collar, although it is more than twelve years since its first application; and of others who have given it up, and are now more distorted than they were previous to using it.

That such is likely to be often the case will be admitted, when it is considered that the effect of the instrument is to obviate all necessity for the action of the muscles of the spine, and consequently to render them so feeble as to be incapable of supporting the weight of the head and shoulders.

The Third Figure is the side view of an instrument which is called an improvement on the last ; it was made in Bath. As pieces of mechanism, both instruments are worthy of admiration ; and if complicated machinery is to be considered an excellence, this one certainly excels the last. The sketch of the contrivance by which the instrument is fixed to the pelvis, gives but an imperfect idea of its complication ; indeed, had I not received it from a young lady who was under my care, I could not have believed that even a person gifted with the most determined resolution to bear up against pain, would have submitted to the punishment of carrying such a machine on the back for twelve months.

As the principle of this instrument is nearly similar to that of the last, the same objections may be made to its use. By the lateral view, we can more easily understand how much force must constantly operate on the chin ; for it will now be evident, that if the patient be fatigued, the whole weight of the shoulders and body must be suspended by the straps which are fixed to the chin and back of the head. The degree of torture suffered by patients in this state, is evinced by the ulcerated condition of the chin, and by their frequently putting their hands to the straps, that they may take off some of the weight from it. It will also be evident that the neck is the only part of the spine which can be much stretched ; for the shoulders, being suspended merely by straps, fall, and thus weigh down the part of the spine to which the ribs are attached, although that be the portion which is generally the most affected.

One of the *improvements* in this machine must increase the patient's suffering, viz. the contrivance for allowing the arch of the instrument to fall back, and which is intended to prevent the patient from stooping

forward. Independently of the pain caused by the bending of the neck against the flat part of the machine, the same objection may be made to the use of this instrument, as that already stated to the common collar, viz. that the more the spine is pulled back by mechanical means, the more will the muscles, by which stooping is prevented, be weakened; the hollow in the upper part of the spine will also be increased by the same contrivance.

EXPLANATION OF THE SEVENTH PLATE.

THIS Plate contains sketches of the principal contrivances, which I have found useful in the treatment of distortion of the spine.

FIG. 1.

The First Figure represents the instrument which is particularly described at p. 212. Its effect upon the muscles of the spine is distinctly shewn by the sketch.

It is evident, that as long as a girl wearing this, sits erect, the lever is kept up, so that there is scarcely any weight operating on the head; but if she stoop, or let the spine fall to one side, the cord is then relaxed, and the lever falls; and by the consequent increase of the power of the weight, the force becomes considerable. To relieve herself from the constant pull, she is obliged to sit upright; and by the exertion to counteract the force of the weight when it falls low on the scale, the muscles by which the spine is naturally kept erect, are much strengthened. This instrument is very manageable; by moving the cord back upon the lever, the force or weight will be much increased, while, by keeping the cord attached to the end of the lever, and moving back the weight, the force will be diminished. The cases in which this apparatus may be useful, are particularly described in the accompanying volume.

FIG. 2.

This sketch may give a general idea of the form of an inclined plane, which I have found to be of the greatest use in the treatment of almost every variety of distortion of the spine. The several parts of the apparatus, and of their application, are minutely described in the accompanying volume, with the assistance of diagrams. The drawing here is not quite accurate. The board on which the shoulders rest should be fixed, and the socket in which the head lies should be moveable. If the shoulders were fastened by straps to the upper part of the sofa, as described at

Fig. 1.

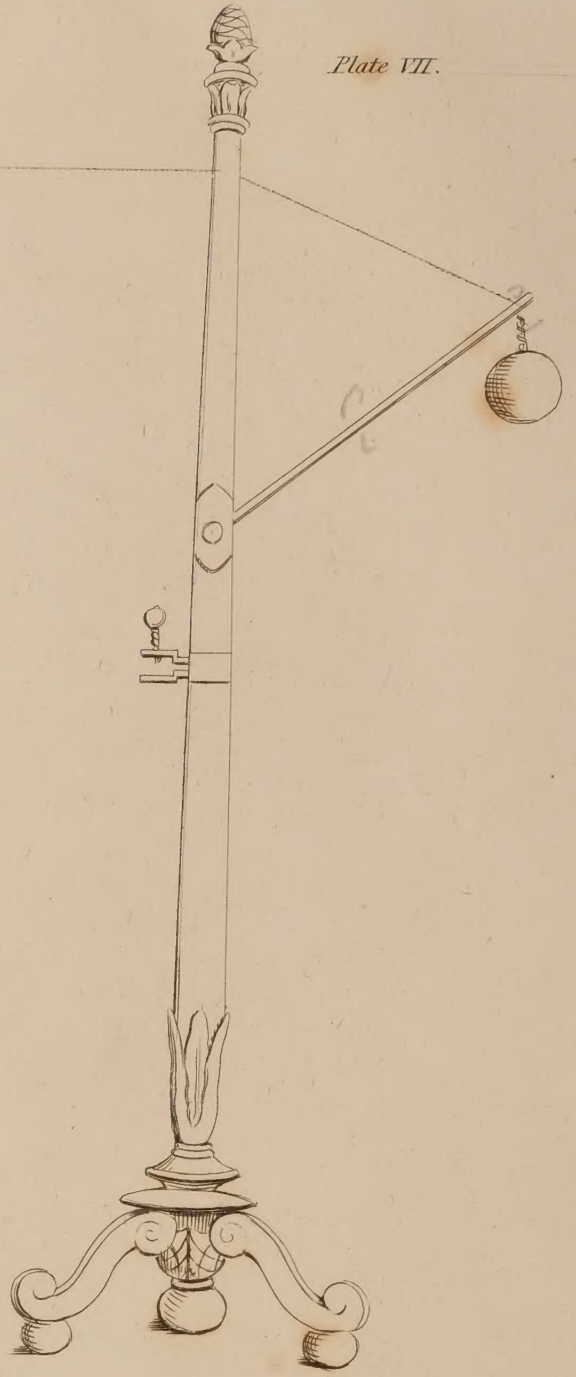
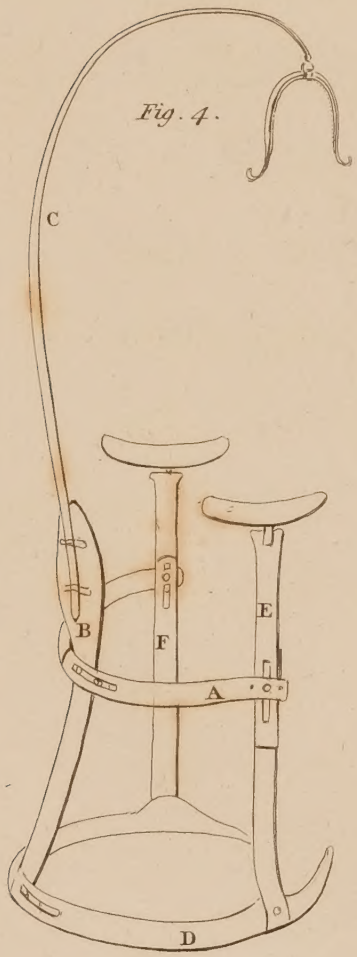


Fig. 4.



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Fig. 2.

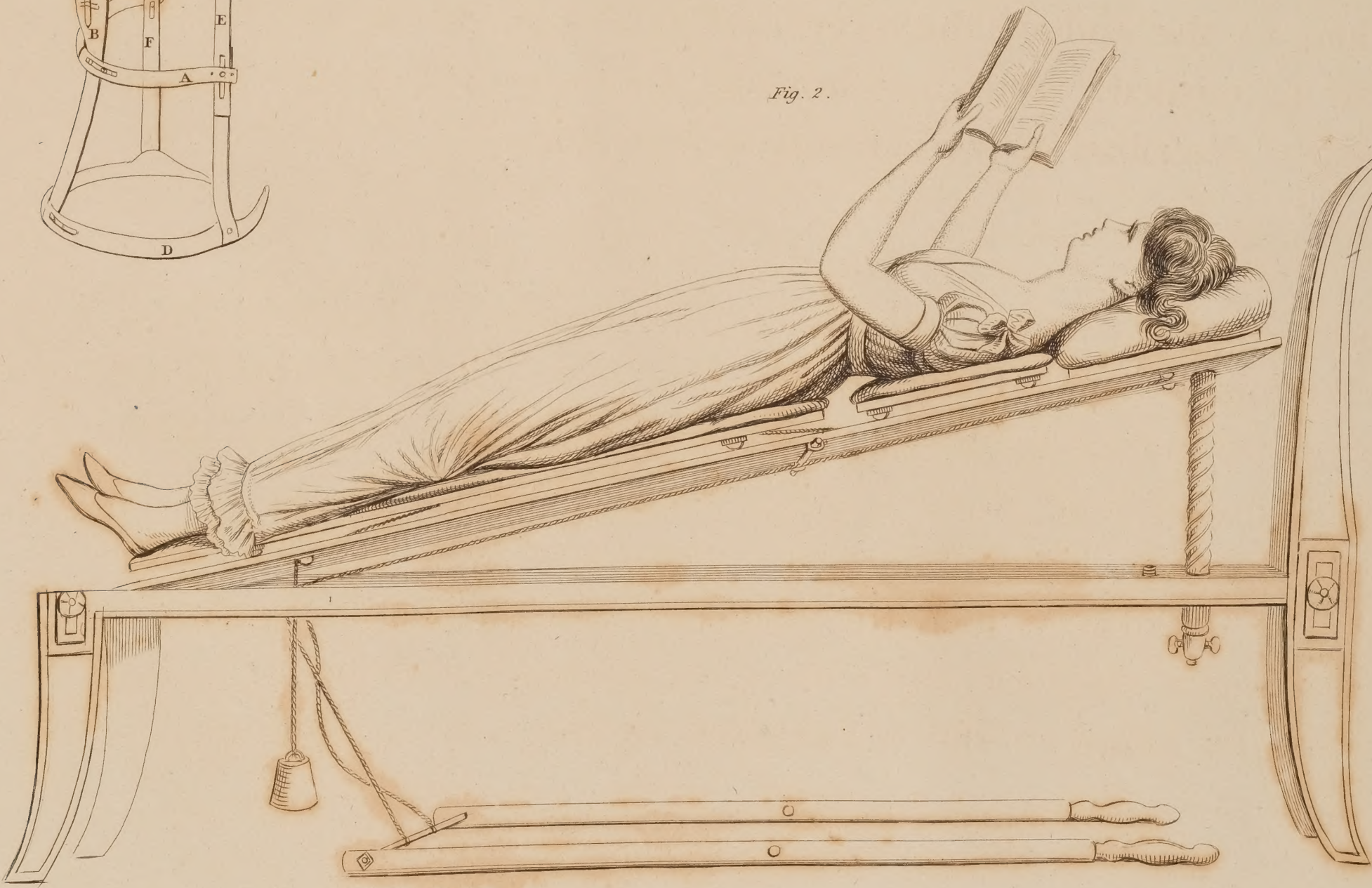
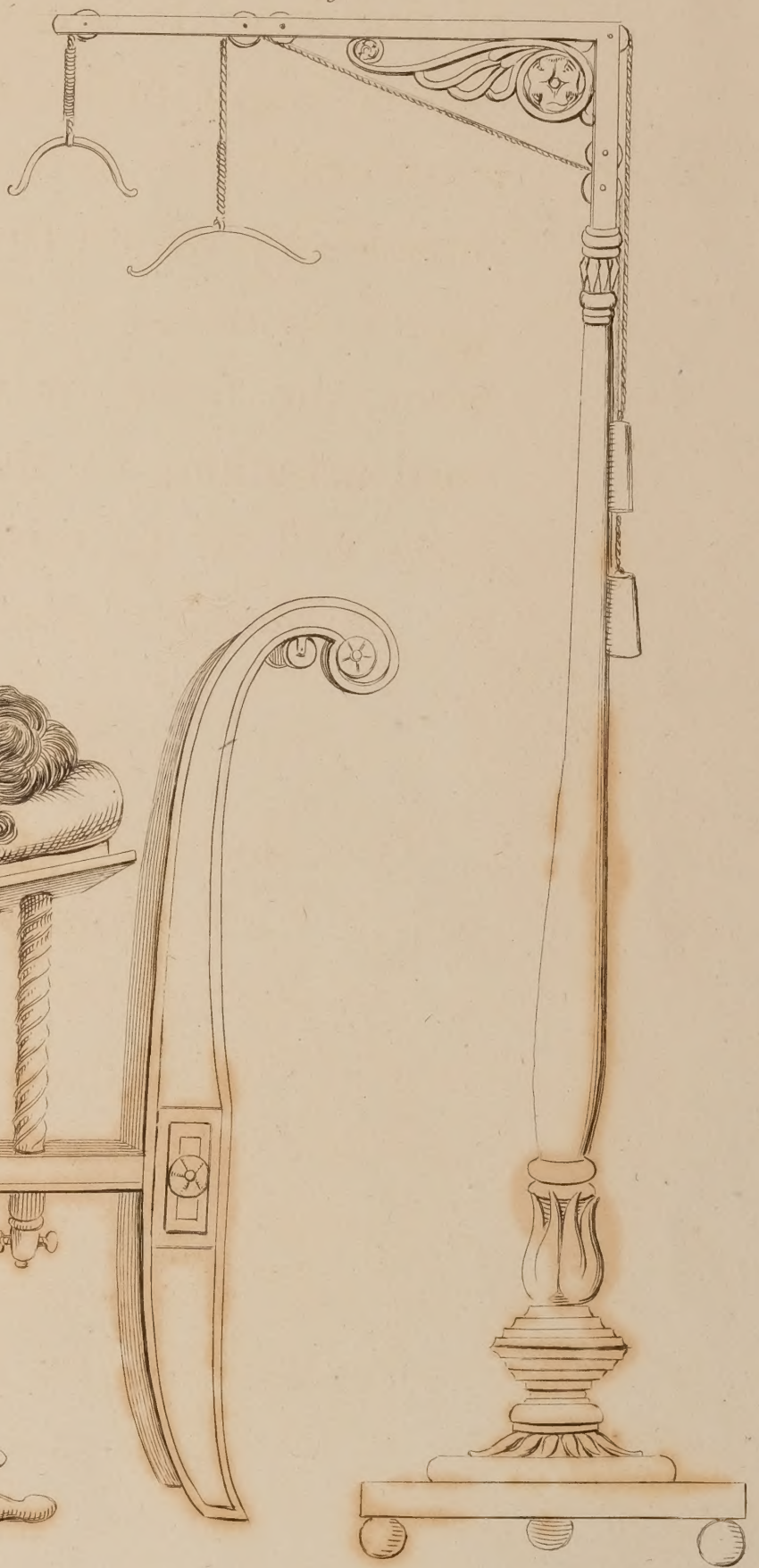
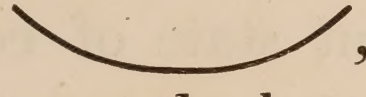


Fig. 3.



have arisen from his indulging in a variety of erroneous speculations on muscular action; one of which is, that when the fibres of muscles are extended, they are in such a state of relaxation as to afford ease. This, it is unnecessary to refute, but here, I may merely state that by some curious experiments lately made in Windmill Street, it has been shewn, that when muscles are extended by a natural action of the limb, they are not passively elongated, nor even in a condition of rest, since they are at that moment suffering under a nervous influence; for example, if the biceps muscle contracts so as to bend the arm, the fibres of the triceps are not merely pulled by it so as to admit of the flexion, but they are under a certain influence in correspondence with the action of the other; in short, if the extensor muscle of the limb of an animal be separated from its insertion, and a weight be appended to it, the weight will be seen to move in correspondence with the actions of the flexor. With regard to the practical question of the superiority of the means proposed by the author to afford relief to the muscles, it is only necessary to appeal to the feelings of those who have had the misfortune to pass a night in a bed, the sacking of which had become so slack as to allow the mattress to sink into this form , for this is the shape of the couch recommended by the author, as the best calculated to give the greatest ease and relief to the muscles of the spine.

I trust I shall stand excused in treating thus lightly, the speculations on a question of anatomy and pathology, by a gentleman who acknowledges, it was not until after having attended several patients with distortion of the spine, that he discovered that the "bony hardness and projection" on the left side of the loins were produced by the transverse processes, or who can permit a speculative theory to carry him so far as to lead him to say, that curvatures, similar to those represented in this volume, are but "a visual as well as a manual deception," that such a condition of the spine "is but a changed aspect of its natural flexures, which are brought into profile, or rather semi-profile, by the aggregate rotatory movement of the vertebræ upon each other."

FIG. 3.

This figure is merely a plan shewing the principle on which an apparatus effecting certain purposes is made. A sketch of the form of the instrument which I generally use is given at p. 245.

This apparatus is intended to be fixed to the back of a chair. From the larger cross, two double cords with springs pass down to be attached to the loops that are fastened to the corset, for the purpose of fixing the shoulder while the patient lies on the plane. The weight connected with this must be sufficiently heavy to support the chest, and to prevent the spine curving at the loins. To the lesser cross, a chin and head strap are to be fixed, and to the cord which is seen passing over the upper pullies, a weight is attached. By this contrivance, both the head and the chest may be supported independently of each other, and in such a manner, that the patient scarcely suffers either pain or inconvenience. It is almost unnecessary to remark, how much superior this manner of supporting the distorted spine is to that by the collars described in the last Plate.

This apparatus is to be used while the patient is sitting. The next figure is a sketch of the apparatus for supporting the body while the patient is walking.

FIG. 4.

The instrument is represented in its most complicated form. All that is generally necessary, is the girdle D to pass round the pelvis, and the upright supports E and F, which may be lengthened or shortened. The cushions on which the shoulders rest move on pivots, so that a patient wearing this instrument can easily turn the body round, and as the uprights also move on the screw by which they are fixed to the girdle, there is no impediment to the bending the body on the pelvis.

When the head and neck require to be supported, it is necessary to have the curved rod C. To fix this to the machine, a back-plate B is screwed to the girdle surrounding the pelvis. It is retained in its proper position by a thin steel plate A, passing between the two supports.

The operation of this instrument is more effectual in supporting the body, and also very different from the complicated machines represented by the first and second figure in the sixth Plate. When these *collars* are used, the whole weight of the body and of the head rests on the chin, but in this instrument, the chin straps only sustain the weight of the head. the chest being supported by the crutches.



On conversing with foreigners on the subject of distortion, we discover that the opinion prevails on the Continent as in England, that all deformities may be cured by the application of machinery, and that the more complicated and ingenious the instrument appears, the more it is admired.

The Plate in the preceding page, copied from one given in illustration of a paper on distortion, which was approved of, and ordered to be printed by the Royal Society of Turin, affords a good proof of the mania for complicated machinery. I have seen an instrument made in London, nearly on the same principle with that represented here ; but the merit of making the most complicated instrument, (which with many is sufficient proof that the inventor understands the treatment of distortions,) must be awarded to the Italian mechanist.

Although it is difficult to conceive how a child could move when encased in the manner represented here, the author says that he has always used the machine with the greatest success, in all the different kinds of distortion of the spine ; he likewise adds, that as it extends from the soles of the feet to the arm-pits, it forms so excellent a support both in sitting and walking, that it would scarcely be possible to contrive an apparatus better calculated to combine flexibility and solidity. We may, however, be excused in doubting the accuracy of the statement, especially as the proposal to push in the circular iron plate B by the screw A, so as to compress the prominent vertebræ, gives us some idea of the notions which the inventor entertained on the subject of distortion.

FINIS.

